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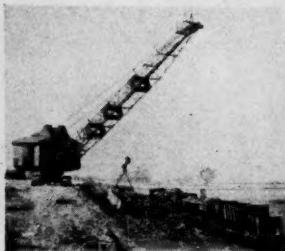
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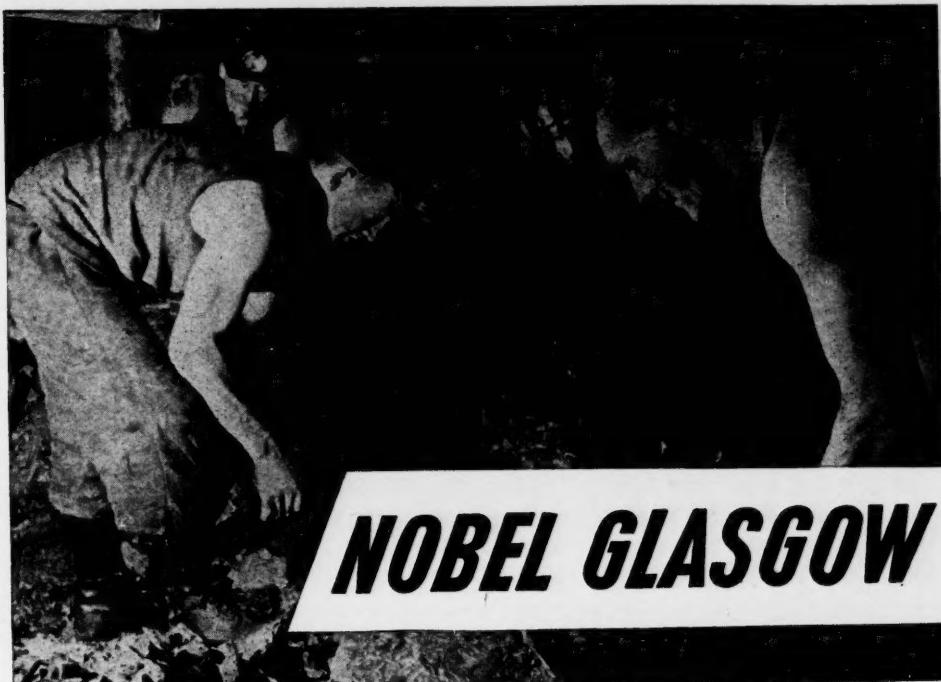
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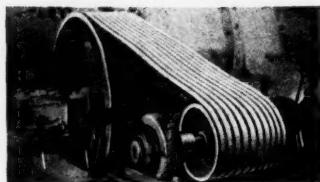
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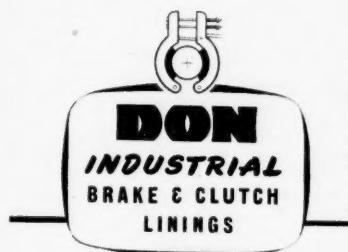
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THIS WEEK'S FEATURES

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NOTES AND COMMENTS

Ministerial Resignations: The Wider Aspects

The resignations announced since our last issue of the Minister of Labour, Mr. Bevan, the President of the Board of Trade, Mr. Wilson, and the Parliamentary Secretary to the Ministry of Supply, Mr. Freeman, has come as a shock to the political and commercial world, comparable in many ways to Mr. Ramsay Macdonald's resignation and subsequent acceptance of a Coalition. That it has taken place during Mr. Attlee's illness and absence from Parliament does not simplify the issue. We have still to hear the Prime Minister's public pronouncements on the situation, but it is clear that so far as he is concerned, he has no intention of following their example, and will carry on at any rate until the Budget is disposed of.

The resignations present two aspects: the political and the material. Regarding the first, we can only surmise that if the Socialist Party was in a strong position, instead of facing an early election, which they may easily lose, these gentlemen would not have felt called upon to resign their posts. Marked differences of opinion between left and right wingers in the Ministry have been notorious over a long period. It is, therefore, hardly surprising if the "stalwarts" have judged it the moment to take a firm stand from which they can call on the faithful to rally to their support for root and branch Socialism and a Welfare State. The issue of dentures and spectacles is too slight to have explained such a challenge to Mr. Attlee's leadership, and, indeed, in their later utterances, the resigning Ministers have sought to expand the challenge to wider issues.

For ourselves, we are concerned rather with the material issue. Both Mr. Bevan and Mr. Wilson have focused their arraignment of the Government's position on rearmament policy which, they say, under existing conditions can only be a sham, as the necessary raw materials to make it effective are not available. Mr. Wilson elaborated this charge into the allegation that the United States had failed to give us our rightful share of materials, and criticised in particular the American stockpile programme and the level of their unrestricted consumption. As regards the latter point our readers know that the United States Administration is in process of imposing severe cuts on all goods for civilian use, but such restrictions are alien to American ideas and have entailed very lengthy negotiations and difficult decisions. Speaking broadly, however, there seems every prospect that by the middle of the year further restraints on civilian industrial consumption of quite unexampled severity will be imposed.

As regards stockpiling, this is a practically novel expedient upon which the United States entered almost directly after the end of the war, without, so far as we are aware, any recorded protest from the Socialist Government. To-day industry generally in the States is becoming increasingly opposed to the continuation of the system, and, in fact, the Administration has indicated that it is likely to suspend it, at any rate, in the case of those metals where the scarcity is most pronounced. For, it must be remembered, that manufacturers and metal producers in the States are becoming very seriously affected by the shortages of those metals and minerals which are most seriously deficient here. In our iron and steel industry much of our difficulties arise from the Socialist Government's own policy. Shortages of coal and its derivatives stem from the nationalization of the coal mining industry and from the immense increases in freight charges due to wage increases and the rising cost of fuel. Freights for all mineral imports, too, have been very sharply advanced by the diversion of shipping to import coal. Moreover, we should not overlook the difficulties of Mr. Truman's administration with its very doubtful majority in Congress, where the Republicans are striving "by hook or by crook" to end the Democrats 20 years' monopoly of power. Whatever concessions the Administration may seek to make to their N.A.T.O. associates are being violently attacked by the Republicans, agriculture and large industrial interests.

Nor are the United States the only stockpilers. The Ministry of Supply has been criticised in America for seeking to outbid United States purchases, and it is somewhat difficult to believe that if the present emergency had been realistically foreseen, that more could not have been done here to provide supplies during the last year or so. We have never liked the idea of stockpile buying, though, like most observers, we could not have anticipated that it would reach its present paralysing dimensions. Some day stockpiling must cease, and it will be difficult to provide effectively for the dissipation of unwanted supplies without disorganizing markets.

However, the most serious issue which the resignation of these Ministers has raised is the threat to Western harmony and rearmament. Next to the United States, Great Britain is the chief prop of allied co-operation. Were this country to serve notice that we were unwilling to play our part in the reorganization of Western defence, the whole structure, towards which political leaders in the associated countries have been earnestly working, would collapse,

and an immense impulse be given to those isolationists in the United States who, like General MacArthur, would concentrate on Western hemisphere defence and leave Europe to stew in its own juice.

Implications of the Alloying Metals Shortage

Subsequent events have proved that the full cost of the rearmament programme was not disclosed in Mr. Gaitskell's Budget statement. To the estimated outlay of £4,700,000,000 over the next three years, must be added the consequential losses through industrial derangement, which threatens to be much heavier than was generally realized.

The Minister of Supply did not mince matters when he told the House of Commons that industry is now faced with "a grave shortage of nickel, tungsten and molybdenum and consequently of alloy steels." These shortages are not due to any shrinkage in supplies. It is the increased requirements imposed by the rearmament programme which have compelled the Minister to enforce restrictions on the use of nickel and alloy steels and these in turn will have serious industrial repercussions. There is no help for it. If rearmament needs are to be met in full, consumption for civilian goods must be drastically curtailed. From May 1, therefore, the use of nickel for less essential purposes will be prohibited, supplies of nickel anodes to the plating trade will be cut to half the 1950 level and stainless steel producers are to get 70 per cent of their 1950 deliveries.

The scarcity of tungsten is a serious matter since its principal use is in the manufacture of machine tools. About 75 per cent of total supplies are used in the production of special steels for tool making and high speed steel. The Korean war has unfortunately cut off one important source of supply from China until recently was providing considerable tonnages also.

For molybdenum, which is used in an even wider range of special steels, we are chiefly dependent on the U.S.A., and imports have recently fallen to such an alarming extent that if rearmament needs are to be fully satisfied there will be scarcely any surplus available for civilian uses. The prospects of any immediate improvement are no doubt included in the current talks in Washington, but whatever the outcome, industry will have to adjust itself to the economies of scarcity and in a wide variety of trades unemployment is likely to increase.

Canadian Titanium Production

The Quebec Iron & Titanium Corporation smelter began operations in October, 1950, states a recent report of the U.S. Bureau of Mines. Ilmenite for the initial smelting operations is obtained from a small ore body near Grader Lake, some two miles south of the Lac Tio deposit. The ore is said to contain 35 per cent TiO_2 , and about 55 per cent Fe_2O_3 . Shipments from Grader Lake are at the rate of 1,710 tons daily. The rail line to Havre St. Pierre is 27 miles and is nearing completion. Mining operations will eventually be centred at the Lac Tio ore body. This deposit is stated to contain in excess of 125,000,000 tons and is said to be the largest known deposit of its kind in the world. Reserves of proved ore constitute "over 225 years supply at the initial treatment rate of 1,500 tons per day." The ore contains 35 to 36 per cent TiO_2 , and 40 to 42 per cent Fe. Cliff, another important ore body, has estimated reserves in the neighbourhood of 12,000,000 tons.

A temporary crushing plant has been built near the loading dock at Havre St. Pierre, pending construction of a permanent and larger plant at Lac Tio. The plant is capable of reducing 250 tons of ore an hour to a screen size of minus 2 in. Loading facilities can handle 2,000 to 2,800 tons an hour, and a 10,000 ton freighter can be loaded in 10 hours. Time for the round trip to Sorel, including loading and unloading, has been established at approximately six days.

The Sorel smelter represents the major expenditure of the entire project. There is installed a 750 ton, 20,000 kWh. furnace, from which experimental tappings are being made. Plans call for the installation, beginning in the spring of 1951, of four additional units larger or smaller than the first, depending on the results of the experimental work, which was to have gone forward during the winter months.

Over 60,000 tons of ore have been delivered to Sorel, and another 40,000 were to have been delivered before navigation closed. This quantity will be ample to carry out operations until late spring or early summer 1951. Titanium oxide slag and pig iron will be produced at an ultimate annual rate of 250,000 and 175,000 tons respectively.

A Successful Experiment

The Royal School of Mines is to be congratulated on the marked success which has attended the recently concluded series of lectures on the elements of mining and mining economics, arranged by the school in collaboration with the Institute of Mining and Metallurgy and the British Overseas Mining Association for the benefit of those in the City who, while they are associated directly or indirectly with the mining industry, were not themselves technically qualified, and are in some cases quite unfamiliar with the principles and practice of the industry.

We believe this to be the first attempt of its kind at bringing those who are so to speak on the fringe of the industry to a better understanding of its processes and problems, and there is no question that the lectures were much appreciated in the City. From the point of view of the Royal School of Mines, however, this has had the possibly embarrassing consequence of whetting the appetites of their new-found students for more. Moreover, it seems clear that more than one repeat course could be filled from among other personnel from the same participating companies quite apart from the possibility of excluding members of metal dealing and stock broking firms. Thus, the problem which must be confronting the sponsors of this successful experiment is whether, as a next step to repeat the existing course and thus spread the admittedly limited knowledge so far imparted as widely as possible, or whether to plan a further course of lectures and discussions for those who have already taken the first course.

On the analogy that a little knowledge can be a dangerous thing, we hope the R.S.M. will take a long term view of the task which they have so commendably assumed and persevere with members of the first class, at least to the point where the material presented in the first course of lectures is fully explained and understood. To say this, is not in any way to criticize the scope or presentation of the first lectures. It is merely a measure of the difficulty of presenting technical or semi-technical subject matter in a condensed form to an audience whose degree of knowledge of the subject was extremely varied.

Similarly, it is no criticism of these lectures to say that they probably raised as many new queries among the audience as they resolved old ones, and if a continuation course is planned we believe that it should be conducted, at any rate in part, on a discussion basis, so that individual difficulties may be cleared up, and we fear that if this is not done, much of the ultimate good, which this first course has undoubtedly achieved, will be dissipated.

With the limited time which the staff of the R.S.M. can be expected to devote to these extra-mural studies, it is clearly too much to expect that this follow-up course could be arranged simultaneously with a repeat of the first set of lectures. The only practical course would therefore seem to be to work on a two-year cycle and to ask the next "intake" to wait a while and perhaps do a little preliminary reading in the interval, for which the R.S.M. will no doubt be glad to supply a suggested short reading list.

Western United States

(From Our Correspondent)

Barstow, Cal., April 8

Mine activities in recent months have had one trend—preparation for defence. This is reflected in increased outputs from mines already in production, reconditioning of mines that have been idle, and increased exploration. The increase of production and the reconditioning of inactive mines have been largely in the commoner metals, while intensive search is being carried on for the rarer metals and the fissionable minerals. Because of price ceilings in this country, many foreign purchasers of non-ferrous metals are acquiring supplies of copper, lead and zinc abroad which normally would be obtained in the United States. The House is considering a Bill to suspend the 2c. copper duty from April 1 to February 15, 1953, subject, however, to the domestic price remaining above 24c. A similar Bill passed the House last June, but died in the Senate.

The country's industry is making an effort to have miners of essential minerals exempted from military service and the Government seems favourably inclined to such a policy. Some further encouragement regarding the attitude of the Government is found in the fact that the Excess Profit Bill, as submitted to Congress, exempts incentive payments to mines and producers of certain strategic minerals as well as liberalizes amortization provisions on short-term enterprises initiated for defence. The Government is also negotiating the financing of several operations which include copper, nickel, manganese, magnesium and aluminium.

Arizona.—Douglas Foundry Co. is constructing a \$300,000 foundry at Douglas for the manufacture of steel grinding balls and other castings for use in the various plants of the Phelps-Dodge Corporation. Phelps-Dodge is planning the open pit operation of its Bisbee east ore body. This development would involve the expenditure of \$25/30,000,000 and would require stripping to a depth of 350 ft. The ore body is of low grade, but of a size comparable with the open pit operation at Morenci. Developments at San Manuel, subsidiary of Magma Copper Co., indicate a very favourable outlook for this operation. Two main shafts, 1,463 and 1,650 ft. deep, have been sunk with some lateral development. Water conditions are not serious and there has been a measurable drop in the water table due to pumping during development. Work in the vicinity of the deeper shaft to determine the nature of the ore from a mining standpoint, shows that it is amenable to caving with good fragmentation, but timbering must be kept close to the work. Bulk samples taken in the course of development indicate a somewhat higher copper content of the ore than estimated from churn drilling. Metallurgical tests are favourable to treatment by standard practice. Total investment in this property before actual production is achieved is estimated at \$75,000,000. Meanwhile, the Defence Minerals Administration has agreed to buy or find a market for San Manuel copper when produced in the sum of \$73,500,000.

The Atomic Energy Commission has recently awarded a contract for the diamond drilling of 30,000 to 50,000 ft. of hole in the Lukachukai Mountain district, to determine if there is sufficient indication of uranium ore to justify the erection of a processing plant in the vicinity.

California.—Empire-Star, at Grass Valley, has leased its entire workings to Robert Morris, a mine operator from Nevada. Empire-Star is a consolidation of the Empire and North Star mines, two of the oldest in California which for years vied with each other as to which was the largest gold producer in the state until surpassed by Idaho Mary-

land after its sensational comeback from the rôle of a "has been." Now Idaho Maryland states that its production has been cut one-third by drastic loss of manpower due to its employees seeking the higher wages paid elsewhere in the copper and lead mines.

The Yuba Consolidated Goldfields Company is preparing to re-dredge 3,500 acres in the Marysville area. Yuba's new dredges will dig 135 ft. below the waterline and can reach gravel too deep for the boats which previously operated on this ground. Twelve miles east of the area to be re-dredged, virgin gravel will be exposed by diverting the Yuba River half a mile from its present channel. Quartz Hill mine, on Scott River, in Siskiyou County, is entering on a new era. Starting in the fifties of the last century, it was worked for years, and until quite recently, as an hydraulic operation. The deposit is a great "blowout" of quartz, very much fractured and oxidized, so that under the impact of the stream from the giants it broke down into particles sufficiently fine to release a sufficient amount of gold to make the operation by this primitive method profitable. It was inevitable that a large amount of the gold would not be freed by such treatment and would escape recovery. Now the ore is to be treated by usual milling methods in a 600-ton plant and initial tests have proven very satisfactory.

Colorado.—The Arkansas Valley smelter of the American Smelting and Refining Co., near Leadville, is being remodelled and new equipment installed to handle increased production of ore and concentrates from the area that it serves. New installation will include a copper dressing plant which will separate copper from the lead bullion and then convert it to matte and speiss, which will be shipped to the company's copper plant at Garfield, Utah, for final treatment. New equipment includes a sinter handling system, slag granulating plant blast furnace and exhaust system for the roasting furnaces. A.S. & R. has taken over operating management of the Keystone mine in Gunnison County, property of Park City Consolidated, of Utah.

The designation of the United States Vanadium Corporation has been changed to Electro Metallurgical Division, Mining Department, Union Carbide and Carbon Corporation, of which latter company "USV" has been a subsidiary. This changes a nomenclature that has been the cause of some confusion in the past between U.S. Vanadium Corporation and Vanadium Corporation of America. The latter company is now operating its uranium-copper mill at Hite, San Juan County, on a round-the-clock basis and is recovering both copper and uranium from its tailings.

Utah Construction Co. has advanced the Leadville drainage tunnel in excess of 1,000 ft. since undertaking the work last August. The job is being done under the supervision of the U.S. Bureau of Mines. Bad ground and an unexpected fault slowed up progress and made it necessary to reduce the cross section for a distance, but the work has passed the bad ground and is now making good progress in firm quartzite formation.

Climax Molybdenum Co. has entered into a contract with the Federal Government by which Climax agrees to maintain maximum production at its mine and mill for the next five years. Previous maximum production was in 1943, when 6,000,000 tons of ore were mined and milled.

Idaho.—Bradley Mining Co., anticipating defence needs, has brought its Ima tungsten mine into production on a 150 ton basis. The property was acquired six years ago and, notwithstanding unfavourable market conditions, development and exploration were continued systematically. During this period, the mill that was on the property

when it was acquired, and which had been operated as a pilot plant, burned out and was replaced by the present 150 ton plant. Many difficulties attended development and operation. The mine is in a remote and rugged district, distant from roads and commercial power. The geology is complex with numerous faults, both pre- and post-mineral. Dips vary within wide limits as do vein widths, making it necessary to adapt mining methods to widely varying conditions. The ore is hubnerite with minor amounts of scheelite and numerous sulphides, such as pyrite, chalcopyrite, galena, sphalerite, also some tetrahedrite, molybdenite and rhodochrosite, altogether a very complex ore. In milling, gravity methods are used on the coarser portions of the feed and in flotation the tungsten minerals are depressed and the sulphides floated with final treatment of the concentrates by magnetic separation. Mill-heads average 0.5 to 0.6 per cent WO₃ and this property is now one of the most important tungsten producers in the country.

The Bradley Mining Co., which is credited with approximately 40 per cent of the domestic tungsten production, is re-working the tailings from its Yellow Pine mill at Stibnite. Yellow Pine produced both tungsten and antimony during World War II, but the deposit has been considered as worked out. Now, in view of increased demand, the tailings are not only being re-treated, but exploration for new ore bodies is being carried on. Federal Mining Co. (A.S. and R.) has completed its four compartment exploration shaft on the Vulcan group in the Coeur d'Alene district from the 800 to 3,000 ft. level and has found encouraging mineral indications in exploration from the shaft during the sinking.

Montana.—Victor Chemical Co. is carrying on extensive development and construction at its phosphate project. At Silver Bow, where there is an intersection of three trunk line railways, the company has acquired a 550 acre plant site and is erecting a \$5,000,000 plant for the treatment of its phosphate ores. Development and exploration of the mine at Maiden Rock is being carried on actively with the goal of a final daily output of 600 tons of elemental phosphorus. Anaconda's copper precipitation plant, near Butte, for the treatment of copper impregnated mine waters, is producing 500,000 lb. of copper monthly from an average daily feed of 30,000 tons of mine water. Shredded tin cans are used as a precipitant and extraction runs from 92 to 94 per cent. Another leaching plant is planned for North Butte Mining Co., which has been inactive since the suspension of premium payments in 1947. Plans are made for an annual recovery of 5,000,000 lb. of cement copper annually and the company plans also a re-opening of some of its zinc properties. Domestic Manganese and Development Co. has made a four-year contract with the Government for producing and treating manganese ores from the Butte and Philipsburg districts for delivery to the Government stockpile.

Nevada.—H. W. Gould and Co., of San Francisco, long identified with quicksilver production, has acquired the Baxter fluorspar mine in the Broken Hills district in Mineral County, which is reputed to contain the largest deposit of high grade fluorspar in the country. The mine has been operated intermittently for the past 25 years and has been opened to a depth of 400 ft. and over a length on the strike of 2,000 ft. The new owners will install a 250 ton heavy media and flotation plant. A considerable tonnage of mill ore is available from dumps and stope filling. Combined Metals Reduction Co. is erecting a heavy media plant as an addition to its flotation mill in the Pioche district. The plant, originally designed for the complex zinc-lead ores of the district, will now produce manganese

concentrates also. These will be shipped to Henderson, Nevada, where Combined Metals has leased part of Basic Magnesium Co.'s plant. Getchell Mine, in Humboldt County, the largest gold producer in the state, is preparing to mine and treat tungsten ore. It has large deposits of tungsten, but during the period of low tungsten prices, directed its efforts towards its gold operations. Colorado River Commission and National Lead Co. have signed contracts relating to power and water which will enable National Lead to proceed with its plans to erect a \$2,000,000 plant at Henderson for the production of titanium metal.

Utah.—Vitro Chemical Co. has bought the Kalunite plant at Salt Lake City and is converting it into a refinery for uranium ores along the lines of the plant that has been in operation at Monticello for several years. The Kalunite plant was erected during World War II for the treatment of alunite ores which were processed to alumina for the manufacture of aluminum. The new uranium plant will serve some of the newly developed districts to which it is more accessible than the plants now in operation.

U.S. Smelting, Refining and Mining Co.'s Lark mine, at Lark, Utah, has been re-opened after being closed since July 16 by an underground fire. The fire area has been sealed off and the hot areas cooled by sprays. The recent agreement between Park-Utah and Silver King Coalition as to mutual operation of the ground adjacent to the Crescent fissure is bearing fruit, as Park-Utah in cross-cutting from its 1,900 ft. level has opened up new ore of a milling grade. The Crescent fissure is in an area in which both companies have interests, but in which geological conditions are so complex that both of them were hesitant about undertaking development for fear of becoming involved in expensive litigation over extraterritorial rights. Last summer, an agreement was reached which provided for mutual operation of the ground.

Washington.—Pend O'Reille Mines and Metals Co. has had its new 2,400 ton lead-zinc concentrator in operation for the past three months and well broken in by now. An underground crusher reduces the ore to 2 in., after which it is delivered to a 30 in. conveyor belt, 1,400 ft. long, on an angle of 17°, which delivers to a 1,200 ton circular concrete bin at the mill. From there on, treatment is by conventional methods with lead and zinc concentrates as the final products. Two more 800 ton units will be constructed as soon as mine development justifies.

The Asbestos Market

Asbestos of Philadelphia, reports that the freeze on prices has somewhat paralyzed business, as retail prices are too low relative to replacement costs though buyers generally have been seeking to enlarge inventories. For asbestos, *crudes* and *fibre*, the demand is greater than supply and raw material is being sought for from all parts of the world. Manufacturers' inventories are estimated at about a month's supply. For *Textiles* demand is general with no relief in sight. *Break Lining* trade is running at the highest level in history. *Paper* requirements continue to be heavy, and the shortage of supply is expected to last throughout the year. For *Millboard*, the demand continues to grow but factory capacity should be adequate to handle it. *High Pressure* insulation business should be good throughout the year though there is some shortage of pipe; there is also an unusual demand for low pressure material. The market for all asbestos-cement materials is strong.

Iron Ore Supplies for Steel Production

One of the sinews of Britain's economy—her iron and steel industry—is faced with a drastic decline in imports of rich iron ores, and scrap, because rearmament has resulted in a sharp increase in demand, both from the U.S. and the Continent. More than topical importance attaches therefore to the following article which describes the plans in hand to develop new iron-ore deposits, e.g., in French West Africa and in Sierra Leone, as well as the steps taken to lessen Britain's dependence on ore imports.

Last year, British steel producers achieved an output of 16,293,000 tons, thus substantially exceeding the forecast made in the Government's *Economic Survey* of 15,750,000 to 16,000,000 tons. Sufficient raw materials were found to meet the requirements of the higher level of production, but during the latter part of the year, repercussions of the war in Korea and rearmament led to a drastic curtailment of imported supplies of both scrap and ores.

Hitherto, the striking increase in output has been balanced and sustained by using a high import of rich iron ore, coupled with large scrap imports, mainly from Germany. The British steel industry has been planning a gradual replacement of imported scrap by increased use of new blast furnace capacity, smelting as much rich imported ore as is economic. It is now facing increased and intensive competition for the available supplies of iron ore, both from America, and from some of the European steel industries, which seek to economize coal by replacing their own lean ores with richer imported ores. The result is a shortage of supplies of rich iron ore, due partly to the coal shortage and partly to American competition; moreover, the problem is being aggravated by the current shipping shortage.

BEARING OF ORE SUPPLIES ON OUTPUT

The Development Committee of the British Iron and Steel Federation has been devoting particular attention to the availability of the raw materials necessary to utilize fully the existing and potential steelmaking capacity over the next three to four years. Among other matters, they have considered schemes for the expansion of sinter plant capacity to make possible the utilization of larger tonnages of imported fines, the construction of additional pig iron capacity based on home ore, and the general acceleration of blast furnace construction. It is with the question of iron ore supplies that this article is primarily concerned. This, of course, has a direct bearing on the expansion of pig iron production, since the availability of ore (in the case of plants dependent on imported ore) may be among the factors limiting the speed with which further furnaces can be brought into operation.

There have been no difficulties in the supply of home ironstone. Consumption last year totalled 12,775,000 tons compared with 13,026,000 tons in 1949. On the other hand, imports of foreign ores fell from 9,045,000 tons during 1949 to 8,726,000 tons last year, although consumption rose in the same period from 8,794,000 tons to 9,066,000 tons. The lower volume of imports was reflected by a reduction in stocks, which fell during the year from 1,282,000 to 945,000 tons.

Throughout 1950, weekly imports of iron ore averaged 700,200 tons, the principal sources of supply being Sweden (286,800 tons), Algeria (123,400 tons), Spain (62,500 tons) and Sierra Leone (61,100 tons). Smaller quantities were received from France, Morocco, Spanish ports in Morocco, Tunis, and various other countries. Commonwealth countries were only responsible for a weekly average of 73,600 tons, in which connection it is noteworthy that supplies from Canada and Newfoundland fell from a weekly average of 59,600 tons in 1949 to 10,200 tons last year. Currency restrictions curtailed shipments from Newfound-

land during the early part of the year. However, since the improvement in the dollar position, the Treasury has sanctioned the resumption of shipments. The British Iron and Steel Corporation (Ore) Ltd. has also concluded a long-term contract for increased annual supplies from Newfoundland until 1956.

Supplies of foreign ores should be substantially improved by two major projects with which B.I.S.C. (Ore) Ltd. is associated. The Corporation is participating with the French to the extent of 33 per cent of the share capital involved, in the development of ore deposits at Conakry, in West Africa. The decision to participate was taken after a full examination of the proposed scheme and followed the study of the first-hand report of an independent mining engineer. Although the ore may not be of the best quality, the project is considered to have favourable prospects since costs are likely to be relatively low.

The British Iron and Steel Research Association is co-operating with B.I.S.C. (Ore) Ltd. and the British Iron and Steel Federation in tests and trials of the Conakry ore. During last year, three trial cargoes were received for furnace tests at leading British steelworks. B.I.S.R.A. made a limited chemical and physical examination of the ores and observers from the Association were present at all three trials. Data were obtained for metal and slag analysis and for top gas analysis. In general, the trials showed that, in spite of high alumina, the ore could be worked satisfactorily, provided that other burden constituents were available in proper balance. The possibility of effecting a removal of alumina has also been examined, since the ore appears to be heterogeneous with dusty particles enclosed in the cavities. Tests have shown, however, that there is no possibility of changing the $\text{Fe}/\text{Al}_2\text{O}_3$ ratio by simple means.

DEVELOPING SIERRA LEONE DEPOSITS

B.I.S.C. (Ore) Ltd. has also been discussing with the Sierra Leone Development Co. a project for the development of deposits at Tonkolili. Subject to revised estimates of capital expenditure, showing the development to be economic, and to the market being available, it is intended to proceed with this undertaking. In September last year, the Federation's technical adviser visited Sierra Leone to examine the project on the spot. It is believed that, by 1957, the combined output of the Marampa and Tonkolili deposits could be raised to some 4,500,000 tons per year, of which up to 1,000,000 tons would be in the form of concentrates.

Improved utilization of foreign ores may result from crushing tests undertaken by the Burden Committee of B.I.S.R.A., using a modified full-scale technique in which detailed sampling and analysis is carried out on samples of a few tons weight only, the crushing being still maintained at the full production rate. Trials with Sierra Leone and Ouenza ores showed that increase of the original maximum size led to increased fines production up to 8 in. size, but not from 8 in. to 10 in. Comparisons have also been made, both overall and stage by stage, of the systems of jaw crusher or double-roll crusher as primary, linked with the cone crusher as secondary, for dealing with imported ore when only small percentages of the total require primary crushing. The proposed work will include

the examination of the fines production from hard and soft ores, from crushers at different settings, to determine the fines make associated with different mean sizes of product.

As an example of the value of this research, a works in South Wales applied the knowledge gained and found that in their conditions the use of a jaw crusher instead of a double-roll crusher at the primary stages resulted in a reduction of fines made from 12 per cent to 2.5 per cent of the whole.

For some 20 years, investigators working under Dr. H. L. Saunders at the Imperial College, have been studying the mechanism by which ores are reduced under conditions simulating blast furnaces. In the course of that work, much has been discovered about the properties of both home and foreign ores. It is now possible to give a very useful indication as to the range to which ores of various sizes should be crushed, in order that they may be reduced sufficiently by the gases in the stacks before the final smelting zone is reached. This, of course, is intimately bound up with the question of fuel economy.

It is evident that there must be some desirable upper limit to the size of the material in the furnace. This limit appears to be influenced to a large extent by the chemical composition of the ore and above all, by its crystalline structure, density and porosity being particularly important considerations. In order to achieve comparable rates of reduction, non-porous ores must be crushed much finer than porous ores. B.I.S.R.A. have classified almost all the foreign ores with which the British iron and steel industry is concerned, and specifications have been laid down regarding the desirable maximum sizes, which range from about 5 in. to 2 in. The laboratory work on the reduction of lump ores has recently been completed by the examination of several ores which were not included in the original list, and by varying the conditions of experiment in certain cases. The results, which will shortly be published, can be expressed in the form of a table of sizes of ore lumps, which will undergo the same amount of reduction in the furnace as a piece of Ouenza ore of 3 in. diameter.

In practice, crushing procedure is complicated because several ores may be used in a single furnace and it is not possible to crush them all to different sizes. Nevertheless, the data obtained by the investigators constitute a useful guide. Though this work was only started some two years ago, it is firmly founded at every point on the previous research work carried out by Dr. Saunders over 20 years.

A further aspect of ore reduction which has been examined is the behaviour of single crystals of hematite and magnetite in a high velocity gas stream of synthetic blast furnace gas at 1,000°C. The reduction of magnetite presents many features which differ from hematite reduction, and attention is being directed to the size of individual crystals in the natural deposits. Whereas in hematite ores these are generally very small, in magnetites they may range up to 500 microns.

REDUCING DEPENDENCE ON IMPORTED ORES

It is considered probable that a substantial degree of substitution of home for imported ores will be necessary this year, and the Pig Iron Liaison Committee are considering when this could best be done with the least possible detriment to pig iron output. The National Council of Associated Iron Ore Producers, in conjunction with the British Iron and Steel Federation, are examining the steps which may be necessary to ensure that adequate supplies are available to meet the increased demand over the next few years.

The bulk of British ores are much lower in iron content than those obtainable from overseas, but their relatively low cost and accessibility render them economic for

domestic consumption. A further consideration of particular importance at the present time is the desirability of minimizing dependence on imported ores. Future developments in production are likely to be confined almost entirely to deposits in the Midlands area. In this connection, Mr. J. R. Menzies-Wilson, O.B.E., has pointed out that the cost of producing home ores is bound to increase with decreasing accessibility and the need for a much heavier expenditure on machinery and equipment. Whereas early mining operations started in the outcrops along the valleys, in many cases it is no longer a question of working ore lying under a shallow overburden. In fact, a walking dragline capable of handling up to 100 ft. of overburden has been constructed by British firms and will shortly come into operation. Costs of foreign ores, however, will also rise as supplies become more inaccessible, quite apart from the temporary factors responsible for the substantial price increases which have recently taken place. The expansion of domestic production is not, therefore, likely to be retarded by cost considerations. So far as availability is concerned, we have a reasonably accurate knowledge of the reserves, which are still quite substantial though by no means unlimited.

RESEARCH WORK IN PROGRESS

To reduce Britain's dependence on foreign supplies by making it possible to utilize British ores with maximum benefit and economy, much research work is now in progress. During the past two decades, many attempts have been made to find a means of increasing the iron content of home ores and concentrating the tailings, but so far, without success. In other directions, however, promising results are being achieved.

A team of investigators is working on ore beneficiation, and laboratory accommodation has been made available at the Imperial College for Petrographic and Chemical Analytical work. The team has familiarized itself with the ore types of the Northamptonshire field, and wet screening and scrubbing trials on samples from various pits are in progress. On sticky Northants ore it has been possible to separate the $\frac{3}{4}$ in. material into clean fractions above and below $\frac{1}{8}$ in., and a reasonably clear separation was obtained at $\frac{1}{4}$ in., the oversize being screenable on moving screens. It seems, therefore, that wet washing is feasible for those ores which require to be followed by screening.

A new technique of X-ray photography has been developed to give quick and accurate indications of the distribution of iron in the ores, to which the normal methods of chemical and microscopic analysis are not applicable, because of the very small size of the grains. Thin sections of ore are cut and X-rays are then passed through these on to a photographic plate. If the wavelength is carefully selected, iron is the only element which absorbs the radiation heavily, thus giving a shadow photograph of varying intensity according to concentration. This technique is leading to a fresh conception of the make-up of some ores in which the ooliths, previously thought to be rich in iron, have in fact only stains or films of Fe_2O_3 , which give a misleading indication of the iron content under the microscope. The technique may be extended to give rapid quantitative results for iron contents, and it is also to be used for the examination of sinters.

Improved utilization of both home and foreign ores may also be expected from many other investigations with which the British Iron and Steel Research Association is concerned. For instance, much fundamental and applied research is being done on sintering, while the work of investigating conditions inside the blast furnace is making very satisfactory progress.

British Industries Fair

The Commonwealth section of exhibits at the British Industries Fair, to be held from April 30 to May 11, has been designed to harmonize with the Festival of Britain. The section is larger this year, with over 20 countries occupying 8,000 sq. ft. of stand space where buyers will be able to see a display of raw materials and industrial goods, showing the progress of trade and civilization in the various territories. One of the largest exhibits will be that of the Dominion of Canada: the stand will show 100 years' expansion in Canada on the theme "Canadians, Great Producers, Great Consumers." Canada will also have a trade information bureau at Castle Bromwich. The Union of South Africa will have a stand on which sections are devoted to agriculture, industry and mining. Replicas will be shown of the Union's world-famous diamonds and demonstrations will illustrate how these are cut. S. Rhodesia's stand, partly concerned with the production of tobacco, will also show the great expansion in recent years of her secondary industries. The value of copper in the economy of Northern Rhodesia will be emphasised in an impressive display by the largest copper producer in the Commonwealth. New Zealand, in her exhibits, will, *inter alia*, show the development of hydroelectric power and transport.

The General Electric Co.

The vital importance to the country of equipment for the generation, transmission, and distribution of electrical power has led The General Electric Co., Ltd., to devote the whole of its stand (No. C.503/402), at Castle Bromwich to its manufacturing resources for this class of work.

The stand will be divided into two parts, one devoted to turbo-alternators and coal handling plant, and the other to certain designs of indoor switchgear.

A working model of a Fraser and Chalmers Marshall Side Discharging Wagon Tippler which, for demonstration purposes, will be shown operating in a closed circuit with a system of Sherwin electromagnetically-operated vibrating feeders, will be a specially interesting exhibit on this stand which will be dominated by a 33 kV., 1,500 M.V.A. duplicate busbar, heavy duty metalclad unit for main power station service. This is the largest unit in this range of switchgear which covers equipment for voltages from 6.6 kV. to 33 kV. with breaking capacities up to 1,500 M.V.A. The design provides for complete phase and cable segregation and complies fully with the official recommendations for avoiding fire risk.

Goodyear Tyre & Rubber Co.

A comprehensive display of the industrial rubber products of the Goodyear Tyre & Rubber Co. will be shown at Birmingham (Stand No. D212). Prominent in the company's display will be Goodyear's wide range of conveyor beltings, including oil and heating resisting belts. There will also be a wide range of transmission belting from 2 ft. 6 in. diameter 2 in. width to 4 ft. 6 in. diameter 6 in. width and a framed display featuring a typical Goodyear endless cord belt on pulleys. Belting of standard types will also be shown.

The past year has seen a vast increase in the use of Goodyear conveyor belts in mines: outstanding were four conveyor belts, the largest ever produced at Wolverhampton, exported to Freetown, Sierra Leone, for mining service. These belts had a total length of 3,780 ft.

Featured also on the Goodyear stand will be stepped down lengths of rotary drilling hose and the new E.R.200 hose which, manufactured with rayon reinforcement, is specially designed for loading and unloading heavy duty petroleum products.

The Consolidated Pneumatic Tool Co.

The Consolidated Pneumatic Tool Co. stand at Castle Bromwich (Outdoor No. 1308) will be in the area devoted to contractors' plant. Its exhibits will comprise all classes of compressed air equipment and a feature of the display will be the new "Feedleg" and Model 32 Rock Drill with tungsten carbide steel, an exhibit of special interest because of the trend towards the use of lighter equipment in tunnelling and mining methods.

Among the heavier exhibits, the biggest unit will be Britain's largest portable air compressor, the Consolidated Pneumatic Model 500. This machine weighs 7½ tons and is 16 ft. long, 7 ft. wide, and 8 ft. high. It is powered by a Ruston Diesel engine with a 12 hour rating of 127 b.h.p., and the compressor has an actual delivery of 500 cu. ft. per minute at a pressure of 125 lb. per sq. in. The company's portable air compressors are made in five other sizes with the following actual delivery figures, 315, 210, 160, 105, and 63 cu. ft. per minute. The two examples from the range of stationary air compressors to be shown are the class "T" horizontal, double-acting, water-cooled plant arranged for belt drive and operating at a normal speed of 275 r.p.m. This model is made in two sizes. The size 14 in. x 13 in. has an actual delivery of 474 cu. ft. free air per minute at 100 lb. per sq. in., and the size 19 in. x 13 in. has an actual delivery of 980 cu. ft. at 40 lb. per sq. in. for use where low pressure air is needed for tunnel work, etc. The other example will be the Class PB-4 Model 210 plant.

The display of pneumatic tools and ancillary plant for compressed air operation will include sinker drills in all sizes; drifters, both hand and power fed; breakers; clay-diggers; pick hammers and pumps and vibrators.

Another item of interest will be the bronze and stainless steel sludge pump for sludge water containing corrosive impurities. This pump will handle a high percentage of solids and its capacity ranges from 54 gallons per minute at 50 ft. head to 16 gallons at 200 ft.

W. E. Bray & Co. Ltd.

This firm of Faggs Road, Feltham, Middlesex, which specializes in hydraulic and winch operated dozers and other tractor operated equipment, will exhibit the following equipment at Castle Bromwich (stand No. 1107 and 1006): Bray "Hydraloaders," fitted with $\frac{1}{2}$, $\frac{1}{4}$ and 1 cu. yd. capacity buckets, respectively; the Fowler VF Tractor, fitted with Bray dozing equipment, and the Fowler "Challenger Mk. III," fitted with Bray dozing equipment.

A full description of the hydraloader appeared in *The Mining Journal* for November 17, 1950, p.483, and particulars concerning the Challenger Mk. III were given on April 6, 1951, p.320.

Shell-Mex and B.P. Ltd.

The many uses of petroleum products in almost every sphere and the high degree to which industry and transport depend on oil will be illustrated most effectively on the Shell-Mex and B.P. stand at the British Industries Fair in Birmingham (Stand No. D317 and 214).

For instance, without lubrication, the wheels of modern civilization would stand still. It is equally essential to the mechanical coal-cutter, the oil engine, the textile spinning frame and the London Underground train. The power station depends on oil for its turbines, for its transformers, for its switchgear. Another example is refrigeration of all types which requires a specially refined oil to withstand the low temperatures and the action of powerful refrigerants.

The British Thomson-Houston Company

Against a background of heavy electrical plant, augmented by dioramas, photographic displays and a scale model of a hydro-electric station, a comprehensive selection of BTH products will be demonstrated at Castle Bromwich (Stand C511/410). These exhibits range in size from a 12-ton, 10-ft. diameter helical gearwheel to such smaller items as a high-speed electronic counter and include power station and industrial switchgear; a three-phase high-voltage contactor unit, particularly suitable for such applications as the control of stator circuits of large induction motors driving mine hoists; electric motors from fractional horsepower sizes up to 50 h.p.; industrial electric control gear, including "Stacrep" crane control; and suds pumps.

BTH switchgear, having a world-wide reputation for reliability and proved performance, is manufactured for every duty, indoor and outdoor, and includes equipment for power station, sub-stations and every industrial application, as well as flameproof equipment for use in mines. The exhibits include a Class QF10 vertical-plugging metal-clad switchgear equipment with oil circuit-breaker rated 350 m.v.a. at 6.6 kv. and 11 kv.; air-break QA341 gear for power station, sub-station and industrial applications; and a BTH Class AJ31 air-break draw-out type switchgear unit coupled to AJ21 truck-type switchgear.

The company now has a range of three-phase, 50-cycle, totally enclosed squirrel-cage induction motors, suitable for voltages up to 700, built to British Standards, and seven of these new BTH type KN motors, covering outputs from 1 to 20 h.p., are exhibited. Another industrial motor exhibit will be an infinitely variable speed 400/440-volt, three-phase a.c. commutator motor, rated $7\frac{1}{2}$ h.p. at 1,450 r.p.m., with a speed range down to standstill, fitted with a stroboscopic disc, to give a visual indication of various specific speeds in the entire speed range.

Also exhibited will be a type DBR492 air-break high-voltage contactor. It is for use on three-phase a.c. circuits for such applications as the control of stator circuits of induction motors driving mine hoists, hydraulic pumps, boiler house fans, pulverizing mills, conveyors, etc. The contactor exhibited is rated 125 amperes, 6.6 kv.

In the development and application of electronic devices to meet the needs of industry, BTH has achieved marked success and, to-day, with a background of over 18 years experience in this field, the company manufactures industrial electronic equipment ranging from photo-electric relays to control panels for the largest welding machines and "Emotrol" (electronic motor control) equipments.

B.T.R.-Silvertown Group

The B.T.R.-Silvertown Group stand at Castle Bromwich (No. D615) will provide a source of valuable news about the development of uses for rubber in industry.

Two B.T.R. developments will be demonstrated on the main frontage—flexible pipes and vibro-insulators. The former, which have important industrial applications in forced lubrication, fuel feed lines and hydraulic systems, will be shown undergoing flexion tests, and a working compressor will demonstrate the remarkable noise and vibration damping effects of rubber-to-metal mountings.

A series of attractive panels will carry samples of conveyor belts, transmission and "V" belts, and hose and tubings.

T.I. Aluminium, Ltd.

This firm, the sales and administrative organization for Reynolds Light Alloys Ltd., Reynolds Rolling Mills Ltd., and for The South Wales Aluminium Co. Ltd., will exhibit at Castle Bromwich (Stand D617/516 and D619/518) aluminium and aluminium alloys, sheet, strip, plate, circles, tubes and extruded sections and bar, made to all standard specifications, as well as corrugated sheet and tread-plate.

Broom & Wade Ltd.

This producer of air compressors, pneumatic tools and rock drills will show a new portable air compressor at Castle Bromwich (Stand 1201 and Outdoor Stand 1100). It is the type SVD.606 portable patented sleeve-valve V-type air compressor, mounted on four pneumatic tyred wheels. Actual delivered capacity, 500 cu. ft. of free air per min., at 100 lb. per sq. in. pressure, when running at 1,100 r.p.m. It is driven by a Ruston 6 V.P.H. six cylinder Diesel engine developing 132 b.h.p. The company's comprehensive range of stationary air compressors will also be fully represented. Visitors to the company's stands will also be able to inspect hammer drills; road breakers; pile driving head, picks and spades; trench pumps, rammers; vibrators; and a crankless air motor driven winch, as well as the new lightweight, roller chain hoist, which lifts 25 times its own weight.

Rapid Magnetic Machines Ltd.

Rapid Magnetic Machines Ltd., Lombard Street, Birmingham 12—a firm which has just celebrated its "Golden Jubilee"—will exhibit at this year's B.I.F. many new machines in their wide range of heavy and light electro and permanent magnetic equipment (Castle Bromwich, Stand C.421). Amongst items of special interest will be the company's "Permaflux" pulley; drum and chute type separators for removing iron from processed materials and an entirely new device, called the "Magna-trap," for extracting ferrous impurities from many liquid and semi-liquid products conveyed by pipe line. Two typical types of magnetic separators for extracting iron from scrap, swarf, borings, etc., will be shown in operation.

The Crockett Laboratory type separator will be exhibited: this is a submerged belt type separator for the positive recovery of cleansing media, i.e., ferrosilicon and magnetite, as used in the heavy media separation process and is of special interest to coal preparation engineers.

Electro magnetic lifting magnets; clutches, as well as brakes and overband type separators will be available for inspection; also two new versions of the popular Magna Sweep, a permanent magnetic floor sweeper for the rapid and continuous collection of nuts, bolts, wire, swarf, etc.

Chloride Batteries Ltd.

The stand of Chloride Batteries Ltd. of Clifton Junction, Manchester, at Castle Bromwich (No. C.301), will reveal the company's nation-wide participation in all the principal sections of the Festival of Britain. For instance, the Royal Festival Hall contains a Chloride Keepalive emergency lighting equipment—the largest Keepalive "B" automatic floating battery system ever supplied. It will power all the auxiliary and emergency lighting circuits and will safeguard the public against sudden interruption in the lighting not only in the concert hall itself, but in the exhibition galleries, practice rooms, restaurants, bars and offices.

The need to keep the attendance at the South Bank Exhibition within limits has led to the installation of novel crowd counting apparatus, which, operated by Exide batteries, simultaneously counts the number of people entering through the turnstiles and the number of those leaving, subtracting one figure from the other. Thus, the total number of visitors in the Exhibition at any one time is kept constantly under review so that, if necessary, steps can be taken to keep the crowd below the danger point. A similar equipment on the Chloride stand at the B.I.F. will show visitors the working of the apparatus.

The use of battery-powered trucks will also be featured on the Chloride stand by a photomontage, depicting the different types of electric trucks used in industry and the jobs that they can do.

REVIEWS

The Stock Exchange Official Year Book, 1951. Vol. I. Thomas Skinner & Co. (Publishers) Ltd., 330, Gresham House, Old Broad Street, London, E.C.2. Price (for the two annual volumes) £6 2s. 6d. post free.

The Stock Exchange Official Year Book (Volume I) contains special chapters on Government, municipal and county finance, and the fullest information regarding Government securities, including Dominion, Colonial and foreign, and the stocks of municipalities and counties.

The company section embraces railways, banks, insurance, breweries, electricity and gas, iron, coal and steel, shipping, oil, rubber and tea, telegraphs and tramways, etc.

Revision of this indispensable year book—which is now in its 77th year of publication—is in constant process throughout the year. In the 1951 volume, special attention is being given to the rights of preference shareholders. Wherever Articles of Association make definite provision, it has been decided to indicate whether or not the creation, or issue, of further shares is deemed to be a modification of the preferential rights. Formerly, it was the practice only to mention those cases where a company is debarred from making further issues without shareholders' consent.

Particulars of the Iron and Steel Act, 1949, with a list of scheduled undertakings, appear at the beginning of the iron, coal and steel section.

New features included in the general information section are the table of charges for quotation to be made by the Council of the Stock Exchange, and by the Associated Stock Exchanges, and the minimum scale of commissions in accordance with the rules and regulations of the Stock Exchange.

The article on "Double Taxation Relief" has again been revised to cover agreements made with several more foreign countries and Colonies, and the provisions of the Finance Act, 1950, giving general relief from double taxation where no specific taxation agreements have been negotiated.

The Register of Defunct and other Companies for 1951 and Volume II of the *Official Year Book* will be published in August, and will include the final details of gas companies nationalized and dissolved under the Gas Act, 1948, including many compensation values which were not determined when the 1950 edition went to press.

Statistical Yearbook, 1949-50.—Second issue. Prepared by the Statistical Office of the United Nations. New York, 1950. Pp. 556. 9 x 11½ in. Obtainable from H.M.S.O. Price £2.

The second issue of this yearbook, prepared by the Statistical Office of the United Nations in collaboration with its specialized agencies, other inter-governmental organizations and the national statistical offices of the various countries, gives, in addition to a wide field of economic and financial statistics, also data relating to population and to social and cultural subjects. It contains 166 tables, supplemented by appendices—showing conversion factors and the principal subjects treated in international statistical yearbooks—and alphabetical subject and country indexes. The territorial scope of this valuable and well-produced yearbook may be judged from the fact that it gives data relating to 250 countries or territories. It is bi-lingual throughout, all titles, notes and text being given in both English and French.

The section devoted to mining and quarrying comprises 27 tables and gives, *inter alia*, figures for the production, between 1930 and 1949, of coal; lignite; the ores of the non-ferrous, alloying and precious metals (platinum excluded); bauxite; magnesite; asbestos; sulphur; pyrites; phosphate rock; salt; and crude oil.

Economic Mineral Deposits.—By Alan M. Bateman. 1950. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. Pp. xi + 916; 5½ x 8½ in. Price £3 net.

The author who is, *inter alia* Silliman Professor of Economic Geology at Yale University, consulting geologist to the Kennecott Copper Corporation, and Editor of the *Journal of Economic Geology*, is to be thanked for having undertaken the task of considerably expanding the contents of this valuable text-book, designed both for elementary and more advanced courses.

The organization of the first edition (published at the end of 1942) has been retained, but many sections have been re-written, consolidated and brought up to date, notably Part I—the heart of the book—devoted to a thorough, but uncomplicated presentation of the principles and processes of formation of mineral deposits; the results of these processes are exemplified in the occurrences described in Parts II and III, respectively, dealing with metallic mineral deposits, and non-metallic mineral deposits, and containing detailed information about the history; production; uses; mineralogy, tenor and treatment; kinds of deposits and origin, and world distribution of minerals, thus rendering these two parts most valuable for reference purposes.

The selected references at the end of each chapter have been expanded. Moreover, many new illustrations have been included, footnotes have been omitted and statistics largely eliminated in order to prevent the books from becoming outdated, but adequate references are made to yearly surveys.

Standard Methods of Analysis of Iron, Steel and Ferro-alloys.—1951, Sheffield: The United Steel Companies, Ltd., xv + 169; 6½ x 9½ in.; Price 17s. 6d.

Since its inception in 1933, due to the late Dr. T. Swinden, this book has had a wide sale throughout the world, and the present fourth edition has been completely revised and much enlarged. The compilation and revisions have been the subject of co-operative effort by chemists from each branch and the Central Research Laboratories of the company, organized as a sub-committee of the companies' Research Directing Committee, and making free use of existing publications and data. The major addition in the fourth edition is a new section dealing with physico-chemical methods which have proved of great value in service.

This book has been used as a standard text book for advanced students in all technical colleges and universities of this country where metallurgy is taught, and the new edition will no doubt be as well received as, and have an ever wider field of usefulness than, its three predecessors.

Underground Management.—By J. S. Ford. 1950, Johannesburg: Johannesburg Consolidated Investment Company. Second Edition. Pp. 526, with diagrams. 5 x 7½ in. No price stated.

This book, the result of the author's long experience in the Rand gold mining industry (Mr. Ford is manager of New State Areas), contains a series of instructions—combined with clear and concise reasons why they are being given—to underground personnel engaged in the many operations required for the efficient running of a mine.

There are 21 chapters, devoted to, *inter alia*, the Gang System for Supervisors; Pipe-fitting and Track-laying; Tramming and Cleaning of Tracks and Drains; Support and Transport Gangs, Concrete Work and Building of Loading Boxes; Breaking; Cleaning; Development; Steep and Flat Mining, and Ventilation. The human factor is always taken account of in this book, which can be warmly recommended to every new entrant into the mining industry.

Metals, Minerals and Alloys

Mr. George Strauss made his expected statement on the metal and mineral situation on Friday of last week, but it was less detailed than Mr. Wilson's jeremiad discussed in our last week's issue, at the beginning of the week, when presumably he had made up his mind to resign from the Government.

Copper.—It has been announced from Washington that the Control Materials Plan, apart from steel and aluminium, would go into force on July 1, next. In general, the Government will apportion the amounts of these metals required for use each quarter for defence and central civil purposes, the residue to be available in a pool for use in non-essential services. Producers, however, have urged the N.P.A. to take over complete control of copper after July 1, otherwise they fear that there will be no copper left for less essential purposes. As anticipated, the Senate Finance Committee has approved the House Bill, suspending the 2c. a lb. import duty on copper, provided the domestic price does not fall below 24c. per lb. and the measure now goes to the floor of the Senate. The Senate Committee recommended that the suspension should continue to February 15, 1953, unless the national emergency ends sooner. Sales for April delivery were 105,000 s.tons towards the end of last week with May sales already some 40,000 tons.

A general agreement between the United States and Chile is reported to have been reached providing for an increased price of 2½c., designed to increase output. This rather suggests that the "official" U.S. price will remain at 24c. Chile, apparently, can supply some of the expected increase in output to non-U.S. countries.

U.K. copper imports in March were heavy at 37,738 tons—electro 22,486 tons, blister 15,252 tons. German output of electro was 10,221 tonnes in February, and of scrap 6,239 tonnes. The supply position is said to be extremely tight.

It is reported from Sydney that the Mount Isa Copper smelting plant, with a capacity of 18,000 tons of copper a year, should be completed before the end of the current year.

Anaconda had a net profit last year of \$46,689,645 or about 71 per cent more than in 1949. The copper output was 458,493 s.tons, besides 229,387 tons of zinc, 62,617 tons of lead, 12,557,173 f.oz. silver, 149,685 f.oz. gold, and 101,765 tons manganese. The new ferro-manganese plant turned out 30,763 tons of alloy. The report states that while the metal prices improved during the year, they did not do so in proportion to increased output costs. Speaking at the annual meeting of the Phelps-Dodge Corporation Mr. Louis Cates said that though from an earnings point of view, results might be considered satisfactory, in a broader sense the year was a most disappointing one. The company's copper output was approximately 244,000 s.tons against 232,000 in the previous year.

Lead.—An announcement was made last week by the General Services Administrator, Mr. Jess Larson, that all stockpile requirements have now been met. No doubt some receipts will continue under long-term contracts, but the agency will not pay above the domestic price. The supply of metal for export is still far short of demand with prices called 19-20c. f.o.b. Gulf Ports. Mexican lead production rose to 24,328 tonnes in January as compared with last year's average of 19,840 tonnes a month. There is no further information regarding the strike position in the country.

U.K. imports in March showed a further heavy drop at 2,294 tons (February 6,644 tons), mainly from Canada.

Tin.—Malayan output in March was 4,816 tons compared with 4,004 tons in February. Indonesian exports were 1,938 tons (2,777 in February); shipments to the U.S. were larger at 884 tons, and to Holland about 50 per cent down at 1,054 tons. First quarter's shipments totalled 6,984 tons against 7,534 tons in the first quarter of last year. The cargo output in March is reported as 1,477 tons.

There has been no change in the U.S. price of grade A tin, which remains at 142c. The price policy of the R.F.C. is still undisclosed, but it is thought to be designed to force prices down. The latest prices for Straits tin are given in our Metal Exchange Correspondence below.

In Washington it is reported that the Bolivian Government has approved a new short-term contract with the R.F.C. This will cover sales from March 1 to May 31, prices to be based on Singapore quotations. It is hoped that by the time this new agreement terminates a long-term contract will have been signed.

It is reported from the Northern Territory of Australia that a mining and milling plant has been obtained to open areas known as the Boomlera Tin Mines.

U.K. imports of metal in March were only 118 tons (383 tons in February). Imports of tin concentrates were heavy at 4,499 tons, of which Bolivia supplied 3,147 tons, and Nigeria 1,210 tons.

Zinc.—While the U.S. "official" price is unchanged at 17.50c. E. St. Louis, stiff premiums are being paid in the open market for limited tonnages for prompt delivery. Prime Western export price is 27.50/29c. per lb. Mexican exports have now been placed under licence. The N.P.A. has asked the Advisory Committee to expand the output of zinc dust. Mr. Larson stated that the fixed price feature of the zinc contracts allowed stockpilers to continue purchases at prices not higher than are allowed on the domestic market.

U.K. imports in March were 10,377 tons compared with 4,954 tons in February. Principal suppliers were U.S.A. 4,820 tons, Canada 4,406 tons. Mexican production fell in January to 12,602 tonnes compared with average output last year of 18,302 tonnes per month. The German supply situation in February was reported to be somewhat improved, though the foundry output was somewhat lower than in January at 10,579 tonnes.

Aluminium.—An increase in the output of the Leunen works is hoped for, to raise the present output figure of 600 tonnes to 1,500 tonnes a month. Construction began in March of the new electric power plant at Braunaub, in Bavaria, which will be used principally to supply the Tögen plant in Bavaria, and the Ranshoffen works in Austria. The Swiss Chippis Co. has taken over the Aluminium Belge from the Cuivre et Zinc Company, of Liège.

Production of bauxite in the U.S. last year totalled 1,347,039 tons while imports totalled 2,476,694 tons, making a total new supply of 3,823,733 tons. Imports were principally from Surinam at 1,923,663 tons. Indonesia took second place with 447,457 tons while British Guiana contributed 91,399 tons. U.K. imports of aluminium in March were 9,822 tons (6,104 tons in February); and of bauxite 17,897 tons (42,685 in February).

A five-year development plan is being formulated for the Indian aluminium industry. Current production is placed at 4,000 tons per annum, and demand around 16,000 tons. It is suggested that the two principal existing units should be expanded to a capacity of 5,000 tons each, and that a new plant should be constructed in the Hirakud area, with a capacity of 15,000 tons a year. Under consideration is the establishment of a central alumina plant. Principal Indian deposits of aluminium ore estimated to total over 250,000,000 tons are in Bihar, Central Provinces and Bombay.

Mr. Roy A. Hunt has been appointed chairman of the Executive Committee of Alcoa and Mr. I. W. Wilson suc-

ceeds him as senior vice-president of the company. Mr. Arthur V. Davis continues chairman of the board.

Nickel.—Though Government rationing of nickel in Canada will be imposed from May 1, no drastic curtailment to civilian industry is expected. While defence projects in Canada, the U.S. and U.K. will receive top priority, it is anticipated in official circles that sufficient quantities would be available to maintain distribution to some of the less essential industries. Most Canadian manufacturers of civilian goods have been rationed to about 65 per cent of their 1950 purchases under the voluntary system. Consumption of nickel in the U.S. in January was about 6,729 s.tons, with imports estimated at 8,121 s.tons. On May 1 the Ministry of Supply will restrict supplies of nickel for stainless steel to 70 per cent of last year's level and of anodes for plating to 50 per cent.

U.K. imports in March were 478 tons (545 tons in February); and of Canadian concentrates and matte 2,917 tons (1,872 tons in February).

Manganese.—An important innovation in the manganese trade is reported by the American Iron and Steel Institute. At Pittsburgh, a miniature blast furnace has been recovering manganese successfully from open-hearth furnace slag, and it is considered by some metallurgists that output from this source might reach 440,000 s.tons of manganese yearly, equivalent to 68 per cent of the steel industry's consumption last year. The Bureau of Mines are making a further study of low grade deposits of manganese iron ore at Aroostock County, Maine, where over 200,000,000 tons are estimated to be available. Mr. Jess Larson stated that it was common knowledge that manganese was in short supply, and that they were buying all they could get their hands on throughout the world, in addition, of course, to projects for obtaining supplies in Brazil and elsewhere.

What is said to be an important manganese mine has been opened at Dilolo, on the Congo Northern Rhodesian frontier. Present Congo output is around 13,000 tonnes yearly.

U.K. imports of manganese ore in March were very small at 14,945 s.tons. Total imports for the first quarter were 97,894 s.tons compared with 124,823 tons, so perhaps the curtailment of steel production may not be entirely unwelcome to users.

Sulphur.—In connection with the planned increase in sulphur production in Sicily, towards which the Italian Chamber of Deputies has approved a 10,000,000,000 Lire programme, it is hoped within a year to double last year's figure for export—180,000 tonnes. Current output is put at 1,700,000 tonnes of crude sulphur (? ore) and 213,000 of refined sulphur.

The U.S. Bureau of Mines Statistics show that last year despite an increase in output to the record figure of 5,192,184 tons, sales considerably exceeded this figure at 5,636,959 tons, reducing stocks at the end of the year to 2,654,530 tons.

U.K. imports of sulphur in March were 27,779 tons, practically all from the United States, compared with 29,669 tons in February. The imports for the first quarter of the year were 86,671 tons, as compared with the allocation reported by Mr. Wilson last week of 81,000 tons. It is officially stated in Washington that second quarter exports will be around 250,000 tons, of which the U.K. will receive 95,000 tons.

U.K. pyrites imports in March were 14,808 tons compared with 14,355 tons in February. Total imports for the quarter were 46,895 tons, fractionally less than for the same quarter a year ago. The U.S. Bureau of Mines gives the 1950 output of by-product sulphuric acid at 740,913 s.tons derived from the roasting of sulphides, principally zinc ores. Zinc plants also produced 243,743 tons of sulphuric acid from sulphur.

Tungsten.—There seems to be quite a number of parcels of wolfram being offered here with a small amount of business resulting, but transactions are not brisk as sales are a question of price. Buyers appear to be waiting to see some kind of stability in the market before they go in to any extent. Hitherto, they have been expecting a drop in price and have consequently been holding off. The price appears to be around 51s. per unit c.i.f.

Mr. Strauss told the House of Commons in his statement on Friday of last week that the Hemmerdon mine in Devon is to be re-opened. It had been reported recently that a start had already been made.

U.K. imports of tungsten ores in March fell to 268 tons as compared with 386 tons in February, mainly owing to diminished receipts from Portugal. Total imports in the first quarter of the year were 914, compared with 1,911 tons for the first quarter of last year.

The London Metal Market

(From Our Metal Exchange Correspondent)

There has been no outstanding feature in the London tin market since our last report. Fluctuations in price have been comparatively moderate and no definite trend is apparent. On Monday, following a sharp fall in the East, the London price declined by £25, whereas on the following day, in spite of further slight easiness in Singapore, the London market advanced some £35. However, this rise was not maintained, the Eastern price not having followed our advance fully.

Continental demand continues quiet, although there has been rather more enquiry during the past week, but little business has resulted.

On Thursday the official close on the tin market was: Settlement Price £1,145, Cash Buyers £1,145, Sellers £1,150; Three Months' Buyers £1,135, Sellers £1,140. In the afternoon the market was unchanged. Turnover for the day was 80 tons. Approximate turnover for the week was 585 tons.

The Eastern price on Thursday morning was equivalent to £1,189 per ton c.i.f. Europe.

Iron and Steel

Manifestly the impact of the colossal defence programme upon the steel industry has not been exaggerated. The issue of substantial specifications for this purpose synchronizing with a shrinkage in production is exercising a restrictive effect upon deliveries to a wide range of iron and steel users at home and abroad.

Apprehensions are heightened by the latest statistics which reveal that stocks of steel at the makers works have been depleted to the extent of 300,000 tons in the last six months and now stand at the lowest level for several years. We are now importing pig iron on a fairly considerable scale, more liberal supplies of European steel semis are needed to keep the re-rolling mills in operation, and the motor trade is dependent to some extent on the imports of sheet steel, to provide their reduced allocation.

Now the Minister of Supply has disclosed that British industry is faced with "a grave shortage of nickel, tungsten and molybdenum, and consequently of alloy steels." He has imposed immediate cuts in the use of these metals for civilian purposes and it is feared that these cuts will have widespread repercussions particularly in the tool making and certain branches of the engineering industries.

In the wider range of iron and steel supplies, export allocations for the second quarter are on a reduced scale and in certain directions it has been intimated that home deliveries will also be cut. The system of controls and licences is being extended and full scale rationing is by no means a remote possibility.

The next probable development is an increase in prices, of which last Saturday's announcement of a rise in the authorized delivered prices of iron and steel scrap is regarded as a prelude. The increases in scrap values vary according to district and specification. They range from 2s. 11d. to 5s. 11d. per ton and are accompanied by an explanation that the increases reflect the recent rises in transport costs.

On this subject the Minister of Supply has been a little more generous than he was last May. Then the advance in rail freight charges was 16½ per cent which was deemed to be covered by a rise of 2s. 9d. per ton in scrap prices. Now a somewhat steeper rise in scrap prices is authorized in consequence of a 10 per cent addition to transport charges.

However, scrap values are still far below their intrinsic worth, and these increases are not calculated to bring any more material on offer. Demand far exceeds the supply but deliveries are improving to a small extent, though there is still vast scope for further expansion.

Scarcity of foreign ore is still limiting blast furnace activities and if no plant has been laid idle, many stacks are working well below capacity. Pig iron deliveries to the foundries are rationed and prospects of improvement are still remote.

APRIL 26 PRICES

COPPER

Electrolytic ...	£210 0 0 d/d
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TIN

(See Metal Notes above for Thursday's Metal Exchange prices)

LEAD

Soft foreign, duty paid ...	£160 0 0 d/d
Soft empire, including secondary lead ...	£160 0 0 d/d
English lead ...	£161 10 0 d/d

ZINC

G.O.B. spelter, foreign, duty paid ...	£160 0 0 d/d
G.O.B. spelter, domestic ...	£160 0 0 d/d
Electrolytic and refined zinc ...	£164 0 0 d/d

ANTIMONY

English (99%) delivered ...	£390 per ton
10 cwt. and over ...	£305 per ton

NICKEL

99.5% (home trade) ...	£406 per ton
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OTHER METALS

Aluminium, £124 per ton.	Palladium (scrap), £8 oz.
Bismuth, 22s. 6d. lb.	Platinum, £27/£33 5s. nom.
Cadmium, 17s. 3d./18s. lb.	Rhodium, £45 oz.
Chromium, 5s. 3d. lb.	Ruthenium, £30 oz.
Cobalt, 24s. 6d. lb.	Quicksilver, £73 10s./£74 ex-warehouse.
Gold, 24s. f.oz.	Selenium, 25s. nom. per lb.
Iridium, £65 oz. nom.	Silver (bar), 78½ f. oz. spot and forward.
Magnesium, 1s. 6d. - 2s. lb. according to quantity.	Silver (bar), 78½ f. oz. spot and forward.
Osmiridium, £35 oz. nom.	Tellurium, 19s. lb.
Osmium, £70 oz. nom.	
Palladium, £8 10s. oz.	

ORES, ALLOYS, ETC.

Bismuth ...	60% 13s. per lb. c.i.f. 50% 12s.
Chrome Ore - Rhodesian Metallurgical (lumpy) ...	£11 per ton c.i.f.
" " (concentrates) ...	£11 per ton c.i.f.
" " Refractory ...	£10 12s. per ton c.i.f.
Baluchistan Metallurgical ...	£11 11s. per ton c.i.f.
Magnesite, ground calcined ...	£26 - £27 d/d
Magnesite, Raw ...	£10 - £11 d/d
Manganese, Best Indian ...	(Nominal)
Molybdenite (85% basis) ...	(Nominal)
Wolfram (65%), U.K. ...	51s. c.i.f. nom.
Tungsten Metal Powder (for steel manufacture)	33s. 9d. nom. per lb. (home)
Ferro-tungsten ...	31s. 9d. nom. per lb. (home)
Carbide, 4-cwt. lots ...	£30 18s. 9d. per ton
Ferro-manganese, home	£34 2s. 4d. per ton
Ferro-manganese, export	Nom.
Brass Wire ...	2s. 4½d.
Brass Tubes, solid drawn ...	ls. 10½d.

International Materials Conference

The Financial Secretary to the Treasury, in a written answer in the House of Commons, made the following statement, issued by the International Materials Conference on April 8:

The Copper-Lead-Zinc Committee has agreed upon the questionnaire to be used to secure requirements and production estimates for 1951 and 1952. Copies have been furnished to all members of the committee for transmittal to their Governments, and letters to all non-member governments which have a significant interest either as producers or consumers were dispatched on March 28 requesting that they supply the date covered by the questionnaire. The questionnaire asks for import and export figures, as well as statements of restrictive controls in effect or contemplated and statements of the possibilities and requirements for increasing production. Replies to the questionnaire are being requested by April 23.

The Committee met last Friday to complete a preliminary review of the 1951 estimate of requirements based upon information furnished by its members during the week of April 2. Such a preliminary review will indicate the probable size and nature of the anticipated deficit in supplies. However, no formal recommendation will be developed by the Committee until it has examined the replies to the questionnaire. The Committee is limiting its current analysis to primary metals but has agreed to examine requirements for semi-fabricated products later. It recognizes the importance of this aspect of the problem to the countries that import such products and the need to develop such methods for insuring equitable treatment to consuming countries as well as producing countries in the event of a deficit in supplies.

The Sulphur Committee has discussed statements submitted by representatives regarding requirements and the steps taken or contemplated to expand production, conserve sulphur, and substitute other materials. A Sub-Committee is now in the process of preparing a first report to accompany preliminary tables of statistics. This report will cover methods of expanding production of sulphur and sulphur-bearing materials, conservation of sulphur and substitution of sulphur and controls regarding the utilization of sulphur. Also, the Committee is studying drafts of letters and questionnaires prepared by the Sub-Committee on Statistics which call for statistical data and information relating to sulphur and sulphur-bearing materials from member and non-member countries.

The Tungsten-Molybdenum Committee has been occupied with the gathering of statistics of production and consumption. Questionnaires have been issued to member governments and certain non-member governments, requesting them to furnish particulars both on production and consumption in past years and on the estimates for 1951 and 1952. When the Full Committee again meets it will give consideration to information assembled by its Sub-Committee on Statistics. It will consider the problem with special reference to the supply position of 1951.

The Manganese-Nickel-Cobalt Committee reports that Sub-Committees on Statistics have compiled available data on production, movements and consumption of manganese, nickel and cobalt in the calendar years 1948, 1949 and 1950, also in 1938 for the first material, and 1943 for the latter ones. The Sub-Committees have drafted a letter to be sent to governments indicating what additional information is desired from them concerning estimates for 1951 and 1952 and the measures taken or contemplated to increase production, restrict consumption and economize in the use of the materials. The Full Committee met last Friday to adopt its Permanent Rules or Procedure and examine the reports of the Statistical Sub-Committees.

The Mining Markets

(By Our Stock Exchange Correspondent)

Before the week-end markets continued the strong upward trend of last week, but the announcement of three ministerial resignations brought about a state of uncertainty. After the recent sharp rises some profit-taking was to be expected, and prices generally eased. There was, however, only a moderate volume of selling.

There has been increasing anxiety over the shortage of sulphur, nickel and tungsten, and official sources have intimated that rearmament needs will receive an overall priority. Against this the General Services Administration in Washington announced that the United States has now ceased to stockpile lead, having reached its objective. America is still purchasing a small amount of zinc.

America is still purchasing a small amount of time.

Kaffirs had rather a patchy week. Individual mines generally showed a little change, although Doornfontein rallied well after their recent spell of weakness. Finance houses strengthened, and there appears to be a steady undercurrent of investment demand for this type of security. Wednesday saw some hesitation in gold share prices, brought about by articles in some sections of the financial press. These mooted a possible upward revaluation of the pound. By the afternoon however, most of the losses were wiped out. Orange Free State shares had a good week. Public interest has again revived in this section, stimulated by the T.V.3 borehole results published last week, and the imminence of production on this new field. Geoffries announced that the Anglo American Corporation have subscribed for 500,000 of their 2s. 6d. reserve shares at 24s. per share, thus giving the company another £600,000 in hand. Arrangements have been completed between Geoffries, Middle Wits, Anglo Transvaal and General Mining for the pooling of contiguous ground in this area, should it later be decided to apply for a mining lease. The first of any such leases would be administered by Anglo Transvaal.

Copper shares were a feature. In spite of profit-taking

in the middle of the week, prices generally went ahead. The agreement between the United States and Chile for a higher price of the metal was taken to mean that the sterling price also would later be adjusted upwards. Mafulira Copper Mines raised their interim dividend from 17½ per cent to 25 per cent, and Rhodesian Selection Trust, which holds a controlling interest in the company, is also raising its interim dividend from 20 per cent to 30 per cent. Last year R.S.T. distributed dividends totalling 50 per cent.

There was more activity among West African shares than for a long time past. These started the week well, showing good all round gains. Later, profit-taking developed and the best levels were not held. Nevertheless, most prices show an upward trend over the week, and this may well be the first sign of returning confidence in this section of the market. The yields on some of the leading shares are decidedly attractive.

Despite the rather uncertain movements in the metal price, tin shares were favoured. The market reports steady buying of most of the popular counters, which generally have not reacted much in past weeks to the buying of equities. Yields in this market still appear disproportionate to other mining shares despite the obvious risks of metal price fluctuations and politics. Tuesday and Wednesday saw prices below the best.

Lead/zinc shares started strongly but finished easier on the decision to cease American stockpiling. Bumper figures are expected from most mines in the section this year. Market rumour anticipates an early dividend announcement by Rhodesia Broken Hill.

Oils encountered profit-taking but steadied later recovering most of the ground lost. Rhodesian Gold issues remained firm on continued rumours that arrangements were being made to sell gold at premium rates for industrial purposes. St. John del Rey fell 3s. on the new issue offer of one share at 25s. for every fourteen held. The company are paying 10 per cent tax free for the year against 7½ per cent tax free.

Company News & Views

"Geoffries" Interesting Announcement

Of outstanding interest, the annual report of General Exploration Orange Free State Ltd.—known as "Geoffries" contains information with regard to one or more new operating companies likely to be formed.

The undertaking has been engaged in drilling since it was floated by General Mining to control and explore their O.F.S. mining ground and results, especially the series of reef bands encountered on property north-west of Odenaalsrus, have intrigued mining interests. It was recently announced that high values had been found in T.V.3 on farm Spes Bona correlating with rich bands encountered in previous drilling 500 ft. east while a continuation of the borehole has struck another conglomerate band.

Following this, the company's report contains the interesting news of an agreement entered into with Anglo-Transvaal, General Mining, Middle Wits and itself for the pooling of contiguous ground in areas in which Middle Wits and "Geoffries" are interested. The agreement covers the farms Van den Heversrust, Kleinbegin, Britzpan, Stephanus Rust and Spes Bona, Rosedale, Weltevreden and Welgevonden. If it be decided to make application for a mining lease the first company to be formed will be administered by Anglo-Transvaal Consolidated. Both "Geoffries" and Middle Wits are to participate in vendor and subscription rights *pro rata* to the estimated tonnage contributed by each company. Any areas not included in the first lease are to be administered by General Mining and vendor and subscription rights are similarly to be based on estimated tonnage. This is rather a novel feature as normally the participation for joint ground has been based on surface area.

Additional to this the annual report gives the Company's other option and participating rights, share investments and financial results. The 1950 accounts show excess of outgo over income of £4,487. Debit balance taken forward is £24,510. From share premium account there was deducted £97,490 off options abandoned, £52,951 off drilling and prospecting areas abandoned, £52,677 off investments and £30,092 to exploration reserve. The company has a cash balance of £6,255.

Welkom Gold Anticipates Crushing

Priority is being given at Welkom to underground work in connection with the haulage between the two shafts. During 1950 both intersected the Basal Reef and sinking was stopped below the reef horizon. The annual reports states that the shafts were equipped and development started. It has gone well ahead and up to the end of March of this year a total of 23,056 ft. of development had been completed, of which 1,316 ft. was driven on the reef and 750 ft. or just over 59 per cent was payable, giving an average assay value of 44.63 dwt.

A substantial amount of work has, of necessity, been in country rock in the immediate vicinity of the shafts and in cross-cutting to the Basal Reef on three levels. It is of the utmost importance that a connecting haulage between the shafts be made as, in accordance with the Mining Laws, only a limited number of workers are permitted underground until a connection is made between the shafts. Work can then go more expeditiously ahead and stoping operations undertaken.

The major portion of tonnage for the mill, when it starts, will be drawn from stoping, although the reef tonnage which is being hoisted from development drives will help in maintaining the throughput in the initial stages. But this is a matter for the near future as production has not yet commenced. Provided the present rate of progress is maintained, the connection between the two shafts will be made about August and if underground development

is not unduly delayed by the intersection of water, production will start this year. This is the promise held out by the chairman in his statement accompanying the annual report. He gives interesting facts regarding other features of the mine and mentions that excellent progress has been made in the development of the town of Welkom.

As regards finance, expenditure during 1950 was £61,945, increasing balance on general capital expenditure to £112,020. The balance sheet shows shares in and loans to associated O.F.S. companies, £3,036,898, while Anglo American Corporation loan at call figures at £296,446.

President Steyn Drilling and Sinking

President Steyn was the first off-shoot of Welkom Gold, launched in 1948, and an interesting account of last year's stewardship is given in the company's 1950 annual report.

In addition to being engaged in the somewhat unspectacular work of shaft sinking, it has accomplished a deal of surface work and put down two exploratory boreholes last year. The No. 1 shaft reached a depth of 3,007 ft. and by the end of March, 1951, had a further 770 ft. to sink before reaching the expected horizon of the Basal Reef. No. 2 shaft had reached a depth of 3,035 ft. at the end of March last and the Basal Reef is estimated to be reached at 4,900 ft. Drilling last year disclosed valuable information for the planning of shaft stations and development. It indicated that large blocks of payable reef will be available above 4,200 ft., and it is the intention to stop No. 1 shaft temporarily below the Basal Reef horizon, so that a start can be made on development operations and the main connecting haulage with No. 2 shaft. This will assist in building up ore reserves in the vicinity of No. 1 shaft and allow crushing to begin at an earlier date than would have been the case if both shafts had had to be sunk to their final depths before any major development programme could be undertaken.

Surface operations have been proceeding satisfactorily with necessary work in connection with headgears, sinking hoists and winders, power plant, compressors, mine workshops, etc. Particular attention is being paid to the housing of employees, their amenities and social recreation. Water is now available from the Vaal River, ensuring an adequate supply, whereas previously, requirements were satisfied by boreholes.

The balance sheet at December 31, 1950, shows expenditure £47,318, increasing debit forward to £88,176. Shaft sinking and equipment figures at £2,145,048, while total assets are £5,278,849. Cash amounts to £245,173.

President Brand's Progressive Work

Although not so advanced in shaft sinking and surface work as the sister undertaking, considerable progress was made during 1950 by President Brand Gold Mining, as the annual report states. The company's property is situated to the south of Welkom and west of President Steyn and operations, so far, have consisted of the sinking of two shafts and preparation for the installation of crushing plant.

At the end of March of this year No. 1 shaft had reached a depth of 2,213 ft., which is estimated to be 2,237 ft. above the horizon of the Basal Reef. No. 2 shaft has attained a depth of 1,529 ft. Sinking has been retarded by the intersection of water-bearing fissures and by difficulties caused by having to use temporary hoists to depths beyond their efficient working capacity. Permanent headgears have, however, been erected and permanent winder and sinking hoists are now operating at both shafts.

A great deal of surface work has been done and a substantial number of mine buildings, stores, compressor houses, etc. completed and brought into use. Accommodation for employees has also been receiving attention though eventually they will be provided for in the township of Welkom which is under construction. A company has been

formed to undertake all future house-building programmes in Welkom and Allanridge.

Shaft sinking, surface buildings and underground development called for an expenditure during 1950 of £1,306,023, bringing the total to £1,510,129. Stores and materials on hand amounted to £380,869. Sundry creditors figure at £142,823. There is a small item of cash, £20,436.

The company has spent all the money raised on its formation and is now financing expenditure through loan facilities provided by Anglo American Corporation. Careful consideration is being given to the question of raising further capital funds.

Western Holdings Development Programme

Apart from its big mining area in the Orange Free State situated to the south of Free State Geduld, which it is bringing to fruition, Western Holdings has a large area of ground south of the Vaal River. In addition it has a portfolio of investments with a book value of £292,782 and debentures valued at £361,625.

During the year 1950, satisfactory progress was made with mining work, although sinking was retarded by the frequent intersection of water-bearing fissures. At the end of March, 1951, No. 1 shaft had reached a depth of 3,425 ft. and the first underground station was cut at 3,100 ft. below surface, while No. 2 shaft had reached a depth of 3,294 ft. Headgear and hoists were erected at both shafts and a permanent Ward Leonard winder at No. 1. Work was also started on the reduction plant, tube mill foundations and the installation of permanent machinery. Other surface operations last year were connected with housing accommodation for employees. Excellent progress was shown in the development of Welkom town, in which the employees are accommodated and the supply of all services has kept abreast of requirements.

It is the intention to temporarily stop shaft sinking below the Basal Reef horizon to enable development to start as soon as possible and the advantages to be gained by this procedure have been confirmed by results in two boreholes. Not only were values very satisfactory but the Basal Reef was proved at a shallower depth in the eastern portion of the property than had been originally anticipated. It is expected that substantial ore reserves will be established above the 4,400 ft. horizon.

The company's revenue and expenditure account show a surplus of £287,200, reflecting profits realized on the sale of shareholdings. Cash resources are £1,585,165 and exceed liabilities by £1,073,071.

Freddies North Progress

Satisfactory progress was made during 1950 by Freddies North Lease Area though, in common with other mines of the Orange Free State, certain handicaps had to be overcome. This is particularly so in connection with shaft sinking.

Two shafts are being put down on the property and although sinking of both proceeded throughout the year, progress was retarded by the repeated intersection of water-bearing fissures. However, the No. 1 shaft was sunk 1,687 ft. and at the end of the year had attained a depth of 4,259 ft. At 3,607 ft. it passed from Ventersdorp Lava into the Lower Sediments. The footage of work in No. 2 shaft was particularly delayed towards the end of last year when an inrush of water flooded the shaft to a depth of 1,160 ft. After overcoming this difficulty sinking continued and at the end of the year the shaft had attained a depth of 3,112 ft.—having been sunk during the twelve months 1,221 ft.

On the surface construction work has gone forward. The installation of electric turbo compressor plant was commenced and the erection of the permanent winders at No. 2 shaft made satisfactory progress. The compressor plant is

for use of both Freddies North and Freddies South, as owing to the proximity of the two mines certain services are being provided and used for the mutual benefit of the two companies. The construction of housing accommodation for European employees was commenced while temporary cottages were completed during the year.

The capital of the company was increased last year to £6,500,000 by the creation of 2,200,000 shares of 10s. each and shareholders were offered £1,247,959 10s. convertible loan stock. The balance sheet at December 31, 1950, shows shafts, buildings, machinery, plant, etc., £2,056,796; general expenditure £295,472. Cash on deposit at bankers' London agents and at mine, £3,339,163.

Freddies South

Although work at the Freddies South Lease Area is not so advanced as that on Freddies North, operations last year progressed both in connection with shaft sinking and on the surface.

Two shafts are being sunk but progress last year, the Annual Report states, was retarded by the repeated intersection of water-bearing fissures. No. 1 shaft was sunk 1,868 ft. to a depth of 3,315 ft. and at 2,720 ft. below the surface it passed out of Ventersdorp Lava and into Lower Sediments. Sinking and equipping was continued normally of No. 2 shaft; it was sunk 1,609 ft. and attained a depth at the end of the year of 3,781 ft. It passed out of Ventersdorp Lava into Lower Sediments at 3,370 ft.

Surface work consisted of excavating for the foundation of the Reduction Works, preparing for the installation of the permanent electric winders at both shafts and providing accommodation for European and Native workers. A start was made in connection with fifty houses to be constructed in a proposed extension of Odendaalsrus Township, which is to accommodate Europeans of both Freddies South and Freddies North Lease Areas.

The company's capital was increased last year to £6,500,000 by the creation of 2,200,000 shares of 10s. each and shareholders were offered £1,273,463 Registered Convertible Loan stock. The balance sheet at December 31, 1950 shows shafts, buildings, machinery, equipment, etc., £2,110,061, General Expenditure, £295,410. Stores on hand and in transit £739,870, while cash on deposit at Bankers London Agents and at mine figures at £2,970,754.

Operations of West Rand Consolidated

The West Rand Consolidated is one of the companies which considers its minor reefs of sufficient importance for a new 40,000 tons a month plant to be erected. The decision was made early last year and in the annual report for 1950 it is estimated that the cost will be £700,000 to be provided out of profits during the three years ending 1952.

The company's plant last year dealt with 2,602,000 tons against 2,546,000 tons in 1949. The yield was lower at 3.25 dwt. and revenue increased to 42.18s. against 33.30s. There was a rise in costs to 24s. 6d. against 22s. 10d. but the working profit came out at 17s. 1d. or a total of £2,291,979, compared with £1,335,446 the previous year. Two dividends were paid of 2s. 9d. against 2s. the previous year, absorbing £584,375, while taxation called for £1,001,396 against £449,495, and the unappropriated balance amounted to £593,120.

The total footage of development amounted to 85,675 ft. which represented an increase of 10,280 ft., compared with the previous year. This work was distributed over the various reefs being worked—Main Reef, South Reef, Livingstone, Bird and Kimberley Reefs. There was an improvement in the percentage of payability of the Main and Kimberley Reef series but the value was slightly lower. The pay percentage of the Livingstone series showed an increase while the value was somewhat higher. The Bird

Reef pay percentage and value were below the previous year's figures. Ore reserves show a slight decline: they amount to 10,047,000 tons of 3.5 dwt. compared with 10,093,000 tons of 3.6 dwt.

The company is one of the four which has arranged with the Atomic Energy Board to extract uranium. The new plant being erected will be used and it will treat ore from the Bird Reef series which ore body contains uranium in quantities considerably in excess of the contents of the other reefs in the mine.

Progress at Vlakfontein

One of the newer mines of the Gold Fields group, the Vlakfontein, issues its annual report for 1950, which gives evidence of further progress.

Owing to the reef depth throughout the mining area and consequent high rock temperature and ventilation difficulties, which make it impossible to mine the whole claim area without enlarging the existing shaft system, it was decided to sink a new shaft on the western section and work in connection with this was commenced last year. Headgear and winders are due for delivery and when erected, sinking will be started.

The tonnage milled last year was higher by 1,500 tons at 419,000, the grade being slightly lower at 7.436 dwt. In common with most other mines working costs rose, being 49s. 11d. compared with 47s. 7d. in 1949, but revenue per ton increased by 15s. 7d. to 93s. 10d. and the working profit was 13s. 3d. per ton higher at 43s. 11d. The total working profit increased to £920,224 as against £640,497. This enabled the dividend to be raised from 1s. 6d. to 2s. per share, absorbing £600,000. The company's pre-production capital expenditure factor has become exhausted and in place of the nominal £8 taxation paid in 1949, an amount of £135,038 was this time called for.

Slightly less development was done: the footage being 44,752 against 45,701 ft., and of the 35,410 ft. sampled, 28.5 per cent proved payable of 9.9 dwt. The previous year pay ratio was 34.6 per cent and value 12 dwt. Development work was concentrated during the year on the southern area of the mine, necessitated by ventilation, and this accounted for the lower value and percentage payability.

Ore reserves were further built up: an increase of 17,000 tons, bringing the total to 1,245,000 of 8.9 dwt.

Difficulties Encountered by Robinson Deep

The massive dyke, which was encountered in a winze put down into the central part of Robinson Deep's proposed new lease area adjoining the southern boundary, has been engaging the attention of the technical staff for some time. Several attempts by means of diamond drilling to locate the position of the reef beyond the dyke have proved unsuccessful and a larger machine has been installed. The company's report for 1950 states that an attempt is now being made to penetrate the strata beyond the dyke by means of a vertical hole drilled downwards. It seems impossible to judge how far the reef may have been displaced, but if it is not encountered, operations would, it seems, be limited to some 1,000 ft. below the old boundary.

The mine is the deepest on the Rand and the company's consulting engineer reports that operations are being carried out under increasingly onerous conditions in respect of depth, ventilation and support of hanging wall. These mining difficulties will, it is expected, result in a further rise in costs and taken together with increases in wages and stores, are nullifying the advantages gained by the increase in the price of gold.

Development results last year were, however, satisfactory. The footage of 23,047 was much about the same as previously but the pay ratio of the 15,930 ft. sampled was better at 33.5 per cent against 39.7 per cent and the value

of 4.8 dwt. went against 4.5 dwt. Compared with the ore reserves at end December, 1949, there is a decrease of 443,000 tons, the value being the same, 3.8 dwt.

A larger tonnage of ore was dealt with—1,385,000 as against 1,322,000 tons—the yield being slightly lower at 3.281 dwt. Working costs rose by 2s. 2d. per ton to 34s. 11d., but was met by increased revenue which at 41s. 6d. per ton compared with 36s. 3d. the previous year. Working profit per ton amounted to 6s. 6d. (against 3s. 6d.) and the total was £455,466 against £232,618. This enabled the dividend to be increased to 3s. compared with 2s., absorbing £250,000. Taxation was higher at £111,100 against £57,674 the previous year.

Simmer's Changed Mining Policy

As a result of devaluation a change in mining policy of Simmer and Jack Mines has taken place. Large tonnages of previously sub-economic ore in the upper levels have become payable and operations are being concentrated to better advantage in these areas. Work in the lower eastern portion of the mine below the 53rd level, where the worse ventilation conditions prevailed, has been temporarily suspended. This has been very helpful and conditions in the central area have greatly improved.

During 1950 the mine's production was affected by pressure bursts and a fire. A lower footage of development was consequently accomplished and the tonnage milled was less, but results generally were better. 1,488,500 tons of ore were crushed compared with 1,490,508 in 1949. The yield was slightly lower at 3.205 dwt. but revenue per ton was up by 5s. to 40s. 6d. This was more than sufficient to meet the upturn in costs—33s. 10d. against 30s. 5d.—and the profit per ton came out at 6s. 7d. as against 5s. —previously. The total working profit of £493,153 went against £373,333 in 1949, and enabled the dividend to be raised from 6d. to 8d. per share, absorbing £225,000. Taxation, which the previous year was £8, called for £1,569.

Development footage of 51,252 went against 58,689 ft. and of the 30,420 ft. sampled, 32.5 per cent (compared with 35.5 per cent) proved payable of 4.4 dwt. against the previous year's value of 5.1 dwt.

The temporary closing down of the lower eastern section of the mine has made approximately 500,000 tons of ore reserve unavailable. This tonnage has been temporarily excluded from the total reserves, which now figure at 3,005,000 of 3.8 dwt. There is altogether a drop of 720,000 tons as compared with the previous year's computation but the value, 3.8 dwt., is the same. Large expenditure has previously been made on shaft sinking, particularly the West Sub-Vertical and work during the year was concentrated on station cutting.

T.C.L.'s Colliery Interest

Although Transvaal Consolidated Land & Exploration does not make a very big showing in the investment realm, it is an interesting member of the Central Mining—Rand Mines group. It functions as colliery owner and an investment company, deriving income from the Van Dyks Drift Colliery as also from farms and township sales, mineral royalties, investments, etc.

During 1950 the colliery's output was slightly less than in the previous year at 584,950 tons against 594,856 tons. High grade coal was produced and there is adequate face room to meet any probable increase in output. In common with other South African colliery undertakings, Van Dyks has had to restrict output in consequence of shortage of railway trucks but the company is using its efforts to endeavour to effect an improvement.

Transvaal Consolidated's revenue from the colliery last year amounted to £102,226 against £102,794 in 1949; Farms and Townships sales brought in £5,588, against

£1,805 and mineral royalties £63,045 compared with £43,571, while income derived from investments was £54,915 (£41,395). Investment realization was less than half that of the previous year at £33,046. After meeting administration expenses, the realized profit for the year was £230,530. A dividend of 1s. 9d. per share was paid, absorbing £81,396, and the unappropriated balance figured out at £194,357. The company's investments stand in the balance-sheet at £374,892, the market value of which largely exceeds the book value.

The two mining ventures—Holfontein and Rietfontein—have not been successful. The latter is on a caretaking basis while in consequence of every reasonable possibility of exploiting the mine to advantage having been exhausted, the Holfontein Gold was put into liquidation.

"Vogels" Projected Plant Extension

An encouraging annual report is issued by Vogelstruisbult, one of the younger mines of the Gold Fields group. It is located to the north-east of Sub Nigel and this latter company has advanced one of its haulages into "Vogels" ground, opening up payable values. The south-western part of the property, on which long-term prospects primarily depend, is bisected by a major down-throw fault which cuts across the Springs property. Developments, however, continue to be satisfactory, as the company's 1950 report states.

Encouraging results have been disclosed on the Kimberley Reef which with the improved ore reserve position warrant an increase in mill tonnage. It has, therefore, been decided to incorporate a fourth unit in the reduction works to increase the capacity to 100,000 tons per month. Preparatory work has been going forward and it is anticipated that the full plant will be in operation during the latter half of 1951 provided delivery of the equipment is not delayed.

Tonnage crushed last year was lower by 2,000 tons at 894,000, and the yield of 4.897 dwt. slightly down. There was a rise of 5s. per ton in costs, reflecting the increase in wages and stores. The higher price for gold, however, resulted in greater revenue which rose to 61s. 11d. per ton (against 50s.), while profit per ton rose from 16s. 7d. to 23s. 6d. and the total working profit to £1,052,596 as compared with £745,529. Dividends were increased to 1s. 10d. against 1s. 2d. absorbing £471,429. Taxation called for £398,937 compared with £199,596, and the balance of £166,243 was transferred to General Reserve, increasing this item to £1,877,243.

Development footage was slightly less—52,734 compared with 54,932 ft. and lower in percentage payability and value. Of the 43,000 ft. sampled, 47.4 per cent proved payable of a value of 6.2 dwt. per ton. Ore reserves have been increased by 240,000 tons to 3,097,000, value 5.5 dwt.

Crown Mines Good Results

The improvement in the average numbers of the labour force during the year enabled Crown Mines to increase both the tonnage milled and the development footage advanced. The former increased by 264,000 tons to 3,375,000 tons and the latter by 14,099 ft. to 109,931 ft. Output of gold also showed a big improvement, rising 18,228 f.oz. to 604,392 oz., though the yield was fractionally lower at 3.58 dwt. Higher wages and the rise in the price of stores were responsible for the increase in working costs of 2s. 4d. per ton milled to 32s. 9d., but this was more than countered by the rise in working profit of 5s. 2d. to 12s. 7d. The net result was that the working profit improved by £967,769 to £2,117,192. From the £3,264,042 available, an amount of £103,346 was transferred for capital expenditure, £56,268 was placed to the forfeited dividends account, and no less than £812,293 against £180,765 was required for taxation. The steep rise in taxation liability was due to the higher ratio of profit

to recovery and to the higher profits earned. Dividend payments totalled 120 per cent and compare with the 65 per cent paid in 1949. The increased distribution absorbed £1,131,675, leaving the carry forward at £1,160,460.

Development footage sampled during the year increased by 24,235 ft., and the payable ore developed amounted to 1,793,800 tons, of an average value of 4.5 dwt. per ton, representing an increase of 436,700 tons compared with the previous year, the value being lower by 0.2 dwt. per ton. Compared with 1949, the available ore reserves decreased by 323,000 tons to 9,212,000 tons, of an average value of 4.5 dwt. per ton.

In the South-eastern part of the mine, where work is being carried out at great depth, a strike dyke was intersected at two points exceeding 9,000 ft. The directors state that investigations are being carried out to determine the course of this intrusion, and the position and value of the reef to the south of it. Meanwhile, plans for sinking further incline shafts in this section of the mine will be held in abeyance.

During the year the sum of £120,538 was received from sales of gold at enhanced prices which is included in the working profit.

Rose Deep's Continued Good Progress

With the exception of a slight drop in yield of 0.118 dwt. to 2.712 dwt. per ton milled, Rose Deep's results for the calendar year 1950 show a big all round improvement. Tonnage crushed increased 48,000 tons to 1,017,000 tons; gold recovered rose 772 oz. to 137,897 oz., and although working costs mounted 2s. 9d. per ton milled to 27s. 11d., this was more than offset by the rise in working profit of 3s. 8d. to 6s. 4d. The net result was that working profit more than doubled, advancing £194,307 to £323,708.

The higher ratio of profit to recovery and the higher profits earned brought into operation the formula tax on gold mining profits with the result that whereas only £7 were paid in 1949, taxation on this year's operations called for £92,131. Dividend payments were stepped up to 35 per cent against 10 per cent and after transferring £10,145 for capital expenditure and taking into account £719 placed to forfeited dividends account, the carry forward amounted to £159,734 compared with £178,659 previously.

Even before devaluation this old Central Rand Mine which has been a producer since 1897 had arrested the tendency of the ore reserves to decline. The year under review added a further 65,000 tons bringing available ore reserves up to 2,364,000 tons, averaging 3.4 dwt. over 57.9 in., equivalent to over 2½ years supply at the current average monthly crushing rate of about 85,000 tons.

Development footage advanced during the year totalled 44,418 ft. exceeding the previous year's record for the mine by 3,445 ft., the payability improving by some 13 per cent.

Although the milling grade is on the low side at 2.7 dwt. the average of the reserves is comfortably higher and the encouraging values which continue to be disclosed in the de-watered sections of the mine should be a helpful factor in maintaining the grade. A further factor of importance to Rose Deep with its small capital of £700,000 is the additional revenue received from gold premium sales. During the year under review additional revenue from this source totalled £24,850 and if current demand for gold at enhanced prices, which is running well above that of 1950 persists, this will materially assist in offsetting rising costs.

Durban Deep's Kimberley Reef Development

The potential earning power of Durban Deep and its ore reserves have been greatly enhanced by the success which has attended development of the Kimberley reef. The importance of this horizon is emphasized in the company's 1950 annual report. The mine is milling at the rate of around 180,000 tons a month and last year dealt with

2,132,000 tons. Yield was 3.45 dwt. per ton and the revenue 7s. 2d. higher at 43s. 9d., but working costs increased by 2s. 5d. per ton to 30s. 6d. Working profit, however, came out at 4s. 9d. higher at 13s. 3d. and the total of £1,409,622 compared with £861,093 the previous year and constituted a record.

Developments were satisfactory although the footage of 81,128 was slightly below that of the previous year. Of the 46,290 ft. sampled, 30,430 or 65.7 per cent was payable, averaging 6.8 dwt. Work was done on four horizons—Main reef, South reef and Kimberley reef—with a small footage on the Main Reef Leader. Development on the Kimberley reef again opened up a substantial amount of ore of satisfactory grade at shallow depths; the percentage payability was higher at 63.1 (against 59.6) but the value was only 4.5 dwt. compared with 5.6 dwt. the previous year. Nevertheless, a substantial amount of payable ore was opened up and the reserves blocked out on this horizon now represent more than ten per cent of the total ore reserves. These stand at 9,312,000 tons of 4.2 dwt. (an increase of 471,000 tons), representing about 4½ years mill feed.

During the year the programme of shaft sinking was continued; No. 2 West and No. 3 West Incline were deepened and are nearing completion; No. 8 shaft, Kimberley reef, was excavated to full width to a depth of 882 ft. below the collar and preparations for hoisting are well advanced. Work on ventilation and other shafts was also proceeded with.

Witwatersrand Gold Mining

Every effort has been made to recover from the old and extensively mined area owned by Wit Gold any tonnages of payable ore. By this means the mine's life has been extended and it says much for the management that operations have continued so long. The undertaking dates back to the 'eighties and is now nearing its end.

The tonnage of ore milled last year of 653,000 was 14,000 more than in 1949 but the recovery was lower at 2,443 dwt. per ton and resulted in a reduction of 8,786 oz. of gold. As on nearly all the mines, working costs trended upwards and at 29s. 1d. compared with 27s. 3d. for 1949. Profit from operations amounted to £42,679 compared with a loss the previous year of £14,305, while a further sum of £15,191 was received in respect of increased revenue from sales of gold at higher than standard price. Two dividends were paid of 2s. 6d., absorbing £58,703 and taxation called for £1,881.

The development footage amounted to 5,906 ft.—an increase of 1,261 ft. over the figure of 1949, and of the 4,660 ft. sampled, 40.3 per cent proved payable of 5.9 dwt. Ore reserves at the end of the year amounted to 186,000 tons of an average value of 2.7 dwt.

Difficulty was experienced in the work of extracting the South Vertical shaft pillar due to pressure bursts and the attempt to re-commission the shaft to the 20th level was abandoned.

The company has disposed of a portion of farms held, in addition to the transfer of the freehold of industrial stand; otherwise the property remains the same.

Randfontein's Increased Production

This prominent member of the "Johnnies" group was able to announce a satisfactory record of operation last year. The mine is situated in the western section of the Rand and retains its position as one of the largest gold producers. No less than eight different reefs have been worked and over a ton milled at full capacity for every £1 of capital. Besides the large mining area the company owns the valuable Randfontein Township and ground on the dip of Venterspost.

Operations last year resulted in a profit of £766,006 compared with £335,526 in 1949, while £90,024 was

received for gold sold at higher than standard price. The throughput was increased by 123,000 tons to 4,192,000 tons and the recovery of 2,339 dwt. was slightly lower than previously. Costs increased to 25s. 6d. as against 21s. 10d., but were well met by revenue, while the dividend was stepped up to 3s. per share against only 1s. the previous year, and absorbed £609,532. Taxation, which the previous year was only the nominal sum of £7, called for £168,449.

More underground work was done: development amounting to 117,311 ft., an increase of 29,103 ft. Of the 56,365 ft. sampled 30.14 per cent proved payable, averaging 6.4 dwt. The previous year 44.9 per cent of the sampling was payable and the value 7.3 dwt. 4,861,140 tons of rock were mined compared with 4,710,277 tons in 1949. Ore reserves were somewhat depleted; the aggregation being 5,550,000 tons of 2.7 dwt. as against 5,750,000 tons of 2.8 dwt. previously.

Information derived from development work and diamond drilling indicated that it was advisable to deepen the North East shaft. A borehole on Gembokfontein 31 was started during the year and reached the Upper Witwatersrand quartzites. A deflection was also made in borehole P.V.4 on farm Panvlakte 44, and the Randfontein Leader Reef was intersected at 7,121 ft., assaying 7.4 dwt. over 6 in.

New State Areas Ebbing Tide

There was little to be found in the annual report of New State Areas promising an extension of the mine's life. It has been working since 1923 and with major development having been completed, reclamation work and the exploring of the older parts of the mine have been concentrated on. Drilling of the Black Reef did not prove successful and payability of the Kimberley Reef has been low.

Development last year showed a decrease of 24,649 ft. compared with the previous period; the footage of work was 10,255 ft. and of the 8,684 ft. sampled, 38.80 per cent proved payable of 12.7 dwt. Apart from the splitting of isolated blocks previously deemed to be unpayable as a whole and an insignificant footage on the Kimberley Reef horizon, no development of any consequence remains to be done in the mine. Ore reserves, which at the end of 1949 were 855,000 tons, have whittled down to 360,000 tons of 3.7 dwt., which would feed the mill but a very short time.

The tonnage dealt with in 1950 was 1,019,000—a decrease of 146,000 tons on that of the previous year—while in addition 420,050 tons of old residues were treated. The recovery per ton from the ore, 2,239 dwt., was lower than previously and working costs registered a rise of 3s. 2d. per ton to 28s. 7d. Profit from operations, excluding an amount of £23,244 received in respect of increased revenue from sales at higher than standard price, of gold sold for industrial and artistic purposes, was £82,025 as compared with £133,058 for 1949. The dividend consequently was reduced from 1s. 9d. paid the previous year to 1s. 4½d., absorbing £104,090. Taxation called for £1,206 and the balance unappropriated carried to the balance sheet was £208,412.

East Champ D'or Profit Increase

Although the milling capacity of this undertaking is small compared with other members of the "Johnnies" group, the 1950 results made an agreeable showing.

The mine is positioned well to the east of Randfontein and has been working two reefs. Development accomplished last year amounted to 8,894 ft., which was rather less than previously, and of the 6,140 ft. sampled, 59.12 per cent proved payable. This was below the pay ratio of the 1949 sampling but the value of 9.4 dwt. was slightly better. Included in the footage sampled was 1,440 ft. on the Bird Reef, and of this 440 ft., or 30.56 per cent proved

to be payable, averaging 4.1 dwt. Results on this horizon, however, have been disappointing and no more exploratory work is to be carried out. Some 11,598 ft. of secondary development were accomplished during the year.

The tonnage of rock mined amounted to 430,709 tons, of which 130,374 tons were taken from blocks included in the ore reserves, which at the end of December, 1950, showed a small decrease at 486,000 tons of 3.5 dwt. as against 500,000 tons of the same value.

Ore milled last year was 393,000 tons—an increase of 20,000 tons—but the recovery was much lower being 2.878 dwt. per ton against 3.362 dwt. previously. Costs rose to 29s. 1d. per ton as against 26s. 10d., but the profit excluding £10,738 received in respect of increased revenue from gold sold at higher than standard price, was higher at £133,077 compared with £110,591 in 1949. This enabled a slight upward revision in the distribution and dividends of 9d. per share against 8½d. were paid, which absorbed £77,962. Provision for taxation was higher at £52,153, while the unappropriated balance was £76,019.

Government Areas Reef Reclamation

In consequence of the gradual exhaustion of the Main Reef Leader, the Government Gold Mining Areas has had to become dependent on the Black Reef, Kimberley, Contact and Leader Reefs for its ore. The mine has had a very profitable life since milling started in 1914 and has well rewarded its sponsors and shareholders alike. It has derived great benefit from the enhanced price for gold though increased working costs have had to be met.

The tonnage milled last year was again increased—2,859,000—which was 164,000 more than in 1949. The recovery of 2.797 dwt. per ton showed a decrease, and costs rose to 28s. 9d. as against 25s. 6d. the previous year. The total working profit, however, was substantially better being £906,398 compared with £550,723 in 1949. This enabled a bigger distribution to be made and dividends totalled 2s. 4½d. per share as against 1s. 6½d. the previous year, absorbing £665,000. The Government's share of profits was £228,547.

A larger amount of development was carried out last year, the footage being 76,041—an increase of 3,898 ft. Of the 60,920 ft. sampled, 48.81 per cent proved payable, averaging 5.2 dwt. Most of the development was carried out in limited and selected areas where it was considered that payability would be encountered. Exploratory work on the Kimberley Reef, designed to ascertain whether any further pay shoots were likely, has continued and was practically completed during the year. Ore reserves at 8,090,000 tons of 3.0 dwt. show a decrease but included in the computation are 496,000 tons on the Kimberley Reef horizon valued at 5.4 dwt. During the year No. 13 shaft Black Reef was sunk from the surface to a final depth of 553 ft.

Triefus' Builds up its Reserves

The impact of rearmament upon an existing high level of industrial activity has accelerated the demand for industrial diamonds. This, in turn, has had favourable repercussions on the operating results for the calendar year 1950 of Triefus & Co., the well-known manufacturers of diamond bits, tools and diamond powder. The gross revenue of the fourth year's trading results, which include dividends received from the company's subsidiaries, amounted to £159,174 compared with £139,937. Expenses remained virtually unchanged at £18,880 giving a net profit of £140,694, an increase of £19,402 over the previous year. Taxation required £67,103, which includes the sum of £44,325 set aside for income tax liabilities in 1951/52, based on the profits obtained for the year under review. General reserve account received £20,000 bringing this fund up to a total of £70,000. Bad debt reserve was increased by £2,250 to bring it more in line with the volume of business now being done, and a stock reserve account, created to provide against any unforeseen changes in the market, also received £20,000. Dividend distributions were maintained at the same rate as last year, namely 13 per cent on the ordinary and 25 per cent on the preferred ordinary shares. These dividends absorbed a net amount of £24,200, leaving the balance £4,707 to be carried forward, compared with £4,166 previously.

The company derive its revenue chiefly from the following sources; firstly, the supplying of industrial diamonds, after classification, for the manufacture of diamond dies, drill bits, tools for dressing abrasive wheels, etc., and this side of the business has gone ahead rapidly, the company's export trade now exceeding 80 per cent of its total sales and secondly, the manufacture of diamond bits and tools which are being increasingly used by mining organizations, both in the U.K., and overseas and, the production of diamond powders. In this latter connection, the chairman reports that the company now has sufficient productive capacity to fulfil all foreseeable demands. Close liaison is maintained between the works, the laboratory and the company's subsidiaries which are located in countries where mining is particularly active.

The outlook for the current year appears promising. Sales of industrial diamonds for the first quarter show an increase on the 1950 figures for the same period and as the company maintains subsidiaries and overseas branches in countries where mining development is active, it is in a strong position to participate in the demand for the essential tools needed by mining companies.

The consolidated profit and loss account which incorporates the results of the company's subsidiaries disclosed a net profit of £163,148 against £137,605.

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March Mine Returns

Gold

WEST AFRICA

Amalgamated Banket.—56,421 tons yielded 7,967 oz.; profit £28,237.
Ashanti.—20,000 tons yielded 16,025 oz.; net mines profit £84,475.
Bibiani.—29,500 tons yielded 6,289 oz.; net mines profit £16,865.
Bremang.—743,600 yds. from 4 dredges yielded 3,909 oz.
Gold Coast M.R.—8,439 tons yielded 2,946 oz.; profit £9,241.
Konongo.—3,405 tons yielded 2,498 oz.; profit £9,293.
Marlu.—40,200 tons yielded 4,353 oz.; profit £14,033.
Taquah.—24,000 tons yielded 6,111 oz.; profit £12,398.

INDIA

Champion.—12,720 tons yielded 5,317 oz.
Mysore.—16,300 tons yielded 4,829 oz.
Mundydroog.—16,550 tons yielded 4,443 oz.
Oregum.—8,885 tons yielded 2,446 oz.

AUSTRALIA

Boulder Pers.—(Feb. 28-Mar. 27). 8,369 tons yielded 2,709 oz.
Central Victoria Dredging.—(Mar. 14-April 10). 120,366 cu. yd. yielded 900 oz.
Croesus Prop.—(Feb. 28-Mar. 27). 7,387 tons yielded 1,650 oz.
Kalgoorlie Enterprise.—(Feb. 28-Mar. 27). 3,438 tons yielded 1,145 oz.
Kalgoorlie Ore.—(Feb. 28-Mar. 27). 12,728 tons yielded 3,486 oz.
Lake View & Star.—(Feb. 28-Mar. 27). 48,344 tons ore and 45,832 tons treated tailings yielded 11,363 oz.
Sons of Gwalia.—(Feb. 28-Mar. 27). 7,006 tons yielded 1,599 oz.
South Kalgoorlie.—7,370 tons yielded 1,594 oz.

MISCELLANEOUS

Bushtick.—8,200 tons yielded 1,115 oz.; loss £760.
Cam & Motor.—20,000 tons yielded £56,466; profit £22,915.
Clutha.—(Feb. 17-Mar. 16). Dredge worked 439 hours yielding 283 oz.
Frontino.—8,751 tons yielded 3,972 oz.
Martha.—(Mar. 6-Mar. 24). 5,232 tons yielded 1,176 oz. gold, 8,102 oz. silver.
Motapa.—23,800 tons yielded 2,360 oz.; profit £4,085.
Rezende.—6,900 tons yielded £13,538; profit £1,422.
St. John D'el Rey.—33,700 tons value of output £252,280.
Thistle-Etna.—5,000 tons yielded 485 oz.

Tin

MALAYA

Ampat.—71½ tons conc.
Batu Selangor.—19½ tons conc.
Berjuntai.—58 tons conc.
Ipoh.—8½ tons.
Jelapang.—23½ tons conc.
Kampung Lanjut.—74½ tons conc.
Kamunting.—31½ tons conc.
Kinta Kellas.—19 tons.
Kinta Tin.—31 tons.
Klang River.—9½ tons conc.
Kramat Tin.—30 tons conc.
Kuala Kampar.—187 tons conc.
Kuchai.—52 tons conc.
Larut.—104 tons conc.
Lower Perak.—93½ tons conc.
Malaysiam.—4 tons.
Rahman.—60½ tons.
Rantau.—53½ tons conc.
Rawang Cone.—45½ tons conc.
Rawang Tin.—70½ tons conc.
Southern Kinta.—344½ tons conc.
Sungei Kinta.—40 tons.
Taiping.—53 tons conc.
Tambah.—20½ tons conc.
Tanjong.—87 tons.
Tongkah Harbour.—71½ tons conc.

NIGERIA

Amalgamated Tin.—534 tons tin conc. and 26 tons columbite.
Bischi.—81 tons tin and 15 tons columbite.
Ex-Lands Nigeria.—68 tons.

Filani.—2 tons.
Gold and Base Metal Lines.—46 tons.
Jantar Nigeria.—20 tons tin and 18 tons columbite.
Jos Tin.—16 tons conc.
Kaduna Prop.—6 tons.
Kaduna Synd.—24 tons.
Keffi.—25 tons conc.
Naraguta Extended.—11½ tons.
Naraguta Karama.—153 tons.
Naraguta Tin.—21 tons tin and 2½ tons columbite.
Ribbon Valley.—8 tons.
Rukuba.—2½ tons.
South Bakru.—10½ tons.
Tin Fields of Nigeria.—3½ tons.
United Tin Areas.—7 tons.

MISCELLANEOUS

Bangrin Tin.—82½ tons.
Berlait Tin.—7 tons tin conc. and 158 tons wolfram conc.
Geevor.—4,696 tons ore yielded 74 tons tin (65 per cent Sn.).
Siamese Tin.—111½ tons.
South Crofty.—1,415 tons ore yielded 16 tons tin.

Coal & Miscellaneous Base Metals

Amal Collieries.—572,321 tons coal.
Apex Minns.—92,100 tons coal.
Broken Hill South.—(Mar. 11-April 7). 19,800 tons ore (assaying 71.6 per cent lead, 51.9 per cent zinc and 4.3 oz. silver), yielded 3,348 tons lead conc. and 3,906 tons zinc conc.
Dundee Coal.—39,070 tons coal.
New Broken Hill.—(Mar. 4-Mar. 31). 15,048 tons ore (assaying 8.8 per cent lead, 11.4 per cent zinc and 2.0 oz. silver) yielded 1,689 tons lead conc. and 2,990 tons zinc conc.
North Broken Hill.—(Mar. 11-April 7). 23,934 tons ore (assaying 13.3 per cent lead, 10.5 per cent zinc, and 6.9 oz. silver), yielded 4,407 tons lead conc. and 4,283 tons zinc conc.
Rhodesia Broken Hill.—1,900 tons zinc and 1,200 tons lead.
South African Coal Estates.—158,134 tons coal.
Springbok Colliery.—82,632 tons coal.
Vryheid Coronation.—49,907 tons coal and 14,377 tons coke.
Wankie Colliery.—180,671 tons coal sales and 8,863 tons coke sales.
Witbank Colliery.—125,649 tons coal.
Zinc Corporation.—(Mar. 4-Mar. 31). 34,742 tons ore (assaying 12.3 per cent lead, 11.5 per cent zinc and 2.3 oz. silver), yielded 5,517 tons lead conc. and 6,886 tons zinc conc.

Tin Companies March Quarterlies

We give below the output figures for the March quarter for a number of tin companies which do not publish monthly figures, and are therefore not included in our monthly mine return figures:

Ayer Hitam Tin Dredging.—243 tons ore.
Bangkin Tin Dredging Co.—252 tons ore.
Chendering Tin Dredging.—47 tons ore.
Gopeng Consolidated.—180½ tons ore.
Hongkong Tin.—148½ tons ore.
Idris Hydraulic Tin.—58½ tons ore.
Ipoh Tin Dredging, Lahat Section.—87 tons ore;
Puchong Section.—149 tons ore.
Kent (F.M.S.) Tin Dredging.—131½ tons ore.
Kepong Dredging.—68 tons ore.
Killinghall Tin.—140 tons ore.
Kinta Tin Mines.—93 tons ore.
Lahat Mines.—53½ tons ore.
Malayan Tin Dredging.—96½ tons ore.
Pari Tin.—11 tons ore.
Pengkalan.—141½ tons ore.
Petaling Tin.—441 tons ore.
Puket Tin Dredging.—126 tons ore.
Pusing Rubber & Tin.—Gross Mining Tribute £3,572.
Rambutan.—24½ tons ore.
Siamese Tin Syndicate.—387 tons ore.
Southern Malayan Tin Dredging.—546 tons ore.
Southern Tronoh Tin Dredging.—230½ tons ore.
Sungei Besi.—229½ tons ore.
Sungei Kinta Tin Dredging.—108½ tons ore.
Sungei Way Dredging.—68½ tons ore.
Tanjong Way Dredging.—279 tons ore.
Tekka.—20½ tons ore.
Tekka-Taiping.—62½ tons ore.
Temoh Tin Dredging.—65½ tons ore.
Tronoh Mines.—363½ tons ore.

Company Shorts

Kundang Tin Dredging.—For the calendar year 1950 this company reports no change in its holding and that negotiations are still proceeding for the dredge of an associated company to work the property. The carry forward was increased by £11 to £36,550.

Gold Coast Consolidated Lands Maintain Dividend.—For the year ending June 30, 1950, Gold Coast Consolidated Lands showed a working profit of £25,614 against £18,722. Expenses generally were higher. £4,000 against £1,500 was paid to the general reserve account (formerly called tin ore reserves depletion account). The carry forward at the fiscal year-end amounted to £2,403. The Chairman is Mr. George Parkins.

Jelapang Tin Dredging.—For the year 1950, profit for the year amounted to £59,341 (£58,790). Taxation required £23,541 leaving a net profit at £35,800 compared with £41,790. Dividend payment amounting to 30 per cent absorbed £33,600. The Balance was struck at £2,200 against £17,790 previously. However, after adding £31,104 brought in and £3,117 received as an interim dividend on account of war damage, and £707 received as final payment for tin sold to the Ministry of Supply in 1949, carry forward was higher at £37,128 against £31,314. During the year 345,71 tons tin ore assaying 75.3 per cent tin metal were recovered.

Larut Tin Fields.—During the calendar year 1950 this company produced a total of 867.69 tons tin ore, with an average assay of 74.68 per cent equivalent to 647.99 tons metallic tin. Net profit for the year amounted to £140,722 against £99,986. The dividend payments totalled 50 per cent absorbing a net amount of £87,000 leaving a balance for the year of £53,722. After bringing forward £107,218, and adding in the sum of £1,856 received as a final payment for tin sold to the Ministry of Supply in 1949 and deducting £100,000 transferred to property contingencies reserve the carry forward was reduced to £62,796 compared with £107,218 previously.

Oceana Development's Modest Progress.—Results for the year 1950 of Oceana Development Co. show that income from investments increased by £2,558 to £9,170. Net working profit also shows a modest increase of £3,383 to £15,025. From the £48,548 available, taxation absorbed £8,704, mineral rights reserve account received £22,862, dividend payment was increased to 10 per cent (73 per cent) absorbing £7,250, leaving the carry forward higher at £9,071 compared with £8,672 previously. Investments at or under cost show an increase of £26,560 at £193,540, though the market value of the quoted securities was lower by £33,025 at £158,589.

New Kleinfontein Forges Ahead.—Results for 1950 of New Kleinfontein show an all round improvement. Tonnage milled increased to 1,326,000 tons, a record for the mine. The milling grade was slightly lower at 2.59% dwt. per ton as was the total of ounces recovered, which declined to 172,116 against 182,397, but the higher gold price enabled working profit to be increased by £279,143 at £589,780. From the £771,507 available, dividend payments totalled 17% per cent (11.8 per cent) absorbing £258,812, and after taking into account all other appropriations the carry forward amounted to £220,996 against £178,043. Good progress has been made on the work of re-opening the Van Ryn Deep section, and it is hoped that it will be in a position to supply some ore to the mill during the current year. Total development footage advanced amounted to 47,693 ft. of which 32,725 ft. were sampled, and 14,054 ft., or 44.4 per cent proved payable, giving an average value of 5.2 dwt. per ton over a reef channel width of 39.3 in.

Geldenhuys Deep Pays Dividend.—Registered in the Transvaal in 1893, this old mine ceased normal mining operations at the end of May, 1947 and clean up operations were completed in May, 1949. All the plant and machinery has been sold and as from July 1, 1949, the property was placed in charge of the caretaker. The company is now principally engaged in disposing of its remaining property, and for the year ended December 30, 1950, total revenue amounted to £64,451 of which £49,797 was in respect of sales of property. Expenditure totalled £23,611 giving a net profit of £40,840 compared with a debit of £9,812 in 1949. To this net figure was added £122,062 brought in, and £1,800 transferred from shareholders contingency reserve, making £164,702 available. Taxation was higher at £9,754 (£1,245), dividend payment of £s. 6d. per share absorbed £42,500, and an amount of £1,850 was placed to the forfeited dividends account leaving the carry forward lower at £110,597 compared with £122,062 previously.

INTERNATIONAL NICKEL COMPANY OF CANADA

The Annual Meeting of the International Nickel Co. of Canada, Ltd., was held on April 25 at Toronto.

Dr. John F. Thompson (Chairman and President), in the course of his speech, said:

The year under review was a year of transition from civilian to defence economy. During 1950 world business in all metals developed at a rapidly increasing rate, as rearmament demands were added to those of industry. Concurrent with this increasing demand, we went into full production at our Canadian plants and at our subsidiary operations in the United States and the United Kingdom.

During the year our deliveries of nickel established a new peace-time peak record. Deliveries in all forms totalled 256,410,543 lb., an increase of 47,118,286 lb. over 1949.

The company's deliveries of platinum, palladium, rhodium, ruthenium and iridium totalled 267,316 oz. in 1950 as compared with 214,735 in 1949. The world supply of platinum group metals is obtained from such widely scattered locations as Canada, South Africa, Russia, Alaska and Colombia. The five platinum group metals that we produce are recovered as by-products of our nickel and copper operations, and are refined at our Acton, England, refinery.

As was true for many other commodities, the demand was much enlarged at mid-year, and leading dealers in the United States found it necessary to ration their supply of platinum. The company increased its deliveries of platinum as far as possible.

For the second time within a decade your company's production facilities are being taxed to the utmost by abnormal demands for nickel. To-day, as during World War II, these are being engendered primarily by defence requirements of the Western nations, but are augmented also by heavy civilian requirements. Although all military requirements are being met—in addition to substantial deliveries to stockpiles—the abnormal over-all demand has exceeded the current nickel supply.

Notwithstanding the fact the ore reserve tonnages have to date been fully maintained, the realization that mines are a wasting asset keeps the company actively engaged in exploration for new sources of nickel.

Ore reserves at the year end stood at 252,859,725 s.tons, compared with 251,805,157 s.tons at the end of 1949. The nickel-copper content stood at 7,669,219 s.tons, compared with 7,630,009 at the end of 1949.

Steady improvement in our mining and metallurgical methods over the past twenty years has made it economically possible to use ores of lower grade than could have been considered in the past.

As reflected in our statement of earnings for the year, our net earnings increased \$16,513,535 over 1949; the cost of pay-rolls, supplies and services increased \$18,894,359; and taxes based on income increased \$9,622,601. The net profit of \$48,765,849 was equivalent to \$3.21 per share on the Common stock, compared with \$2.08 per share for 1949 and \$2.55 for 1948.

It is estimated that capital expenditures in 1951 will exceed \$20,000,000. Such expenditures in 1950 were \$18,683,606, an increase of \$129,755 over 1949. By countries expenditures last year were: \$16,604,594 in Canada, \$1,519,928 in the United States and \$359,084 in the United Kingdom and other countries.

Common and Preferred dividends paid since January 1, 1929, after the present company had become the parent corporation, have totalled \$507,600,000 to the end of 1950, out of net earnings of \$619,000,000.

During 1950 four quarterly dividends of 40c. per share were paid on the Common shares, with an extra dividend of 40c. in December, the same as payments in the past three years. Four regular quarterly dividends of \$1.75 per \$100 of par value were paid on the Preferred shares.

Our primary contributions to the rearmament of the free world are nickel and other metals produced by the company's plants in Canada. Our rolling mills and foundry in the United States and the United Kingdom are likewise heavily engaged in defence production, their contributions consisting of special nickel alloys whose peace-time usefulness translates readily into military applications.

Mr. Robert C. Stanley, who presided at these annual meetings as president or chairman of the Board for the past 28 years, died on February 12, 1951. He contributed a lifetime of distinguished service to Canada and the nickel industry. We have reproduced in the annual report the tribute paid to him by the Board of Directors when he retired from the presidency in 1949. Many at this meeting, and many who will read this address, were his friends. He will be remembered by them with respect and affection.

The report was adopted.

CAMP BIRD, LTD.

The Forty-Ninth Annual General Meeting of Camp Bird, Ltd., was held on April 25 in London.

Mr. F. C. Heley, the Chairman, who presided in the course of his speech said:—

In summary, the year's operations have yielded a dividend of 10 per cent after taxation and transferring the sum of £65,000 to the credit of investment reserve. The unappropriated profits carried forward amount to £49,000, which is almost identical with the sum brought forward from the previous year.

I would draw your attention to the formula under which our investments are valued from year to year, namely cost, Stock Exchange value, or directors' valuation, whichever is the lowest. At the balancing date the Stock Exchange valuation of certain of our investments showed an aggregate depreciation of nearly £80,000, and absorbed practically the whole of our investment reserve. I should point out, however, that this should not necessarily be regarded as a permanent loss of capital. In fact, a proportion of this depreciation was recovered during the early months of the current year, and on the other hand no credit has been taken, for obvious reasons, for the very substantial appreciation which has taken place in the value of some of our more important investments. Under the circumstances we have deemed it prudent to replenish the investment reserve account by the sum of £65,000, as already mentioned. The book value of our quoted investments shows an increase of £59,000 and unquoted an increase of £28,000 as compared with last year.

Realization of investments covered a fairly wide field and, together with sundry receipts, principally interest, yielded a profit of £91,000, which is £30,000 less than the previous year. On the other hand, income from dividends at £108,000 showed an increase of no less than £64,000. This was largely due to the entry of the Lake George Mining Corporation Ltd. into the dividend list. The profit resulting from the tributary of the Camp Bird Mine shows an increase of over £1,000, but I cannot claim that this is due to the new arrangements which I described to you in my address last year. It results from a smaller number of dollars being able to purchase a larger number of pounds, owing to the devaluation of our currency.

Current assets are £95,000 down as compared with the previous year, an amount roughly equivalent to the increase in the book value of our investments. Current liabilities are £16,000 up, and a third of this sum represents the increase in income tax liability.

It is gratifying to us that the Lake George Mining Corporation Ltd., has at long last commenced the payment of dividends. It has been a long wait, but our courage is now we hope to be rewarded. Two dividends each of 1s. per share were declared during the year under review, and an interim of 1s. 6d. per share has already been declared for the current year.

I was interested to learn from the chairman's address at the recent annual general meeting of that company that there is a possibility of the discovery of further ore bodies. The general manager of the local company has reported as follows:—In such a large area it is difficult to believe that the Elliott's and Keating's lodes are the only ones worth exploiting, and further detailed work on the gossans should bring out some interesting facts.

I have already referred to the financial results from the Camp Bird mine. Although these do not show any material improvement over the previous year, we are satisfied that the new management is proving very efficient. In particular, the underground production per man shift is up by nearly 50 per cent and improvements are being effected to the mill.

We have decided to grant a new lease of the mine for a period of five years, being confident that the lessors will do everything possible to expedite development and increase the tonnage of ore treated.

The categories of our investments remain substantially the same as last year, namely, in round figures, 63 per cent in gold and platinum mining, 17 per cent in silver and base-metals, and 20 per cent in miscellaneous. Their geographical distribution is as follows:—South Africa and Rhodesia, 63 per cent; Australia, 11 per cent; America, 11 per cent; West Africa, 1 per cent and elsewhere 14 per cent. The above percentages are based upon book values.

As you are aware, I have always insisted that Stock Exchange prices do not provide a safe basis on which to calculate the actual value of our portfolio of investments. It may, however, be permissible to use that method for purely comparative purposes. For what it is worth, therefore, I can report that at December 31, 1949, the net amount of the company's assets worked out at 18s. 7d. per share, while at December 31, 1950, the figure was 21s. 6d. per share. These figures are before making provision for the dividend.

The report was adopted.

PRESIDENT BRAND GOLD MINING COMPANY (Inc. in the Union of S. Africa)

DEVELOPMENT PROGRESS

MR. H. F. OPPENHEIMER ON NEED FOR FURTHER CAPITAL

The Second Annual General Meeting of President Brand Gold Mining Co., Ltd., will be held on May 15, at 44, Main Street, Johannesburg.

The following is an extract from a statement by the Chairman, **Mr. H. F. Oppenheimer**, dated March 31, 1951, circulated with the report and accounts for the year ended December 31, 1950.

Considerable progress was made during the year on your company's property in the installation of plant and equipment and in shaft sinking.

No. 1 shaft was sunk 1,494 ft. during the year and at the end of March had reached a depth of 2,213 ft. which is estimated to be 2,237 ft. above the horizon of the Basal Reef. At No. 2 shaft the collar was completed in March, 1950, and by the end of March, 1951, the shaft had been sunk 1,529 ft.

The rate of sinking at both shafts was retarded by the intersection of water-bearing fissures which required sealing by cementation, and by the difficulties caused by having to use temporary hoists to depths which were beyond their efficient working capacity. During the year, however, the permanent steel headgears at both shafts were brought into commission and permanent winders and sinking hoists are now operating at both shafts. It is hoped that by taking full advantage of the experience gained on other mines in the Free State the rate of sinking will be increased.

HOUSING PROGRAMME

Good progress was made during the year on the erection of mine buildings, a substantial number of which have now been completed and brought into use.

Fifty "Airlift" houses were constructed and are at present being used as temporary accommodation for natives employed at No. 2 shaft. These houses are the nucleus of the mine native village and will be used to accommodate married native employees and their families when the native hostel is completed.

Water from the Vaal River water supply scheme was made available for use by the mine in May, 1950.

The building of houses and residences for married and single European employees continued during the year. Although the housing programme was handicapped by a shortage of building labour, it is hoped that the shortage of houses for mine employees, which has existed since the start of operations in the Welkom area, will be overcome before the end of the present year.

In October, 1950, Anglo American (O.F.S.) Housing Co., Ltd., was registered with the object of taking over at cost all the houses and the two single men's residences which had been built for the account of the seven mines in the Orange Free State which are administered by the Anglo American Corporation of South Africa, Ltd. The housing company will undertake all future house-building programmes in Welkom and Allanridge on behalf of the mines and will lease these houses to the mining companies for occupation by their employees.

During the year your company subscribed at par for 560,000 shares in the housing company. Loraine Gold Mines, Ltd., and Jeannette Gold Mines, Ltd., will buy at par 160,000 of these shares in the proportion of 80,000 shares each in the near future, thus reducing the company's holding to 400,000 shares of £1 each. This will be your company's total capital commitment for the housing of its European employees up to the production stage.

EXPENDITURE ON SHAFT SINKING

Expenditure during the year on shaft sinking, surface and underground development and buildings amounted to £1,306,023. The increase of £1,010,741 reflected in the balance-sheet under the heading "Shaft sinking and equipment" comprises this expenditure less an amount of £295,282 refunded by Anglo American (O.F.S.) Housing Co., Ltd., in respect of expenditure incurred by the company on housing to December 31, 1950.

Your company has spent all the money raised on its formation, and is at present financing expenditure through loan facilities provided by Anglo American Corporation of South Africa, Ltd. Careful consideration is being given to the question of raising further capital funds for the company, and an announcement in this connection will be made in due course.

The directors' borrowing powers are at present limited to 50 per cent of the issued capital of the company, and advantage is being taken of the general meeting of stockholders on May 15, 1951, to place before you a resolution which, if passed, will empower your directors to borrow up to three times the issued capital of the company.

**PRESIDENT STEYN
GOLD MINING COMPANY**
(Inc. in the Union of S. Africa)
SHAFT SINKING PROGRESS

The Third Annual General Meeting of President Steyn Gold Mining Co., Ltd., will be held on May 15 at 44, Main Street, Johannesburg.

The following is an extract from a statement by the Chairman, Mr. H. F. Oppenheimer, dated March 31, 1951, circulated with the report and accounts for the year ended December 31, 1950.

The mining lease which was ceded to your company by Welkom Gold Mining Co., Ltd., on August 11, 1949, in terms of that company's flotation agreement, was registered on March 15, 1950, under No. 436, and cession of the lease into your company's name was registered on the same day under No. 438. The agreement providing for the adjustment of the common boundary of your company's lease area and the lease area of Welkom Gold Mining Co., Ltd., the reasons for which adjustment have previously been advised, is in course of being finalized and the exchange of ground should be effected during this year.

INTERSECTION OF BASAL REEF

Good progress was made in shaft sinking at both shafts of the company's mine during the year. No. 1 shaft was sunk a further 1,819 ft. to a depth of 3,007 ft. at December 31, 1950, and by the end of March, 1951, a further 770 ft. remained to be sunk to reach the expected horizon of the Basal Reef. No. 2 shaft advanced 1,819 ft. during the year and at the end of March, 1951, had reached a depth of 3,035 ft. The horizon of the Basal Reef in this shaft is estimated to be at 4,900 ft. Two boreholes, W.P.5 and W.P.6 were sunk during the year in the neighbourhood of No. 1 shaft to obtain further information for planning the elevation of the shaft stations and the development programme from this shaft. In borehole W.P.5 an initial intersection of the Basal Reef at 3,468 ft. assayed 53 in.-dwt., while in a deflection a value of 328 in.-dwt. was obtained at 3,446 ft. Borehole W.P.6 intersected the Basal Reef at 3,932 ft. assaying 546 in.-dwt.

DEVELOPMENT OPERATIONS

The depths at which these holes intersected the Basal reef and the satisfactory values obtained indicate that a large block of payable reef is available above 4,200 ft., and the technical advisers recommend that No. 1 shaft should be stopped temporarily at a point just below the Basal reef horizon so that a start can be made on development operations and the main connecting haulage with No. 2 shaft. This will assist in building up ore reserves in the vicinity of No. 1 shaft and will allow crushing operations to begin at an earlier date than would have been the case if both shafts had had to be sunk to their final depths before any major development programme could be undertaken.

Good progress was made during the year on buildings at the mine and a substantial building programme is still being undertaken.

Water from the Vaal River was made available to the mine in March, 1950, ensuring an adequate supply for the requirements of the mine which were previously satisfied by boreholes on the property.

HOUSING COMPANY REGISTERED

In October, 1950, a company was registered under the name of Anglo American (O.F.S.) Housing Co., Ltd., with the object of taking over at cost all the houses and residences built for the account of the seven mines in the Orange Free State, which are administered by Anglo American Corporation of South Africa, Ltd. This company will be responsible for the provision of all the housing requirements of the seven mines and will lease the houses as erected to the respective mining companies for occupation by their employees.

The item in the balance-sheet "Shareholding in Anglo American (O.F.S.) Housing Co., Ltd., £560,000," represents the subscription by the company of 560,000 shares at par in the housing company. 160,000 of these shares will be sold at par to Loratine Gold Mines, Ltd., and Jeannette Gold Mines, Ltd., in the proportion of 80,000 shares each, in the near future. This will reduce your company's holding to 400,000 shares of £1 each, which will be its total capital expenditure commitment for housing its employees to the production stage.

There is little else in the balance-sheet calling for comment. It will be noted that the item "Shaft Sinking and Equipment," shows an increase of £1,191,848, which represents expenditure during the year on shaft sinking, surface and underground development and buildings amounting to £1,586,657, less an amount of £394,809 refunded to the company by Anglo American (O.F.S.), Housing Co., Ltd., being expenditure incurred by the company on housing to December 31, 1950.

WELKOM GOLD MINING CO.

(Inc. in the Union of S. Africa)

DEVELOPMENT PROGRESS

The Fourth Annual General Meeting of Welkom Gold Mining Co., Ltd., will be held on May 15, at 44, Main Street, Johannesburg.

The following is an extract from the statement by the Chairman, Mr. H. F. Oppenheimer, dated March 31, 1951, circulated with the report and accounts for the year ended December 31, 1950:

During the year 1950 both shafts intersected the Basal Reef and shaft-sinking operations were stopped below the reef horizon. The shafts were equipped and development operations started soon after the middle of the year.

Up to the end of March, 1951, a total of 23,056 ft. of development had been completed from both shafts, of this, 1,316 ft. was driven on reef and 730 ft. or 59.6 per cent was payable, giving an average assay value of 44.63 dwt. over an average width of 8.81 in. equivalent to 393 in.-dwt.

A substantial amount of the development during last year and the first quarter of 1951 was in country rock in the immediate vicinity of the shafts and in crosscutting to the Basal Reef on three levels. It is of the utmost importance that a connecting haulage between the shafts should be completed as soon as possible as until this occurs only a limited number of employees are permitted by law to work underground and stoping operations cannot be undertaken.

Priority is being given to this work as it is from stoping that the major portion of the mill tonnage will be drawn although the reef tonnage which is being hoisted from development drives is being dumped and will help in maintaining the tonnage in the initial stages.

Provided the present rate of progress is maintained the connection between the two shafts will be made in about August, and if underground development is not unduly delayed by the intersection of water, production will start this year.

The Electricity Supply Commission is taking every possible step to maintain and increase the power supply available to the Free State Mines and it is anticipated that no delay in starting the reduction plant which is now complete will be caused through a shortage of power.

The installation of machinery and plant and the erection of mine buildings continued satisfactorily during the year.

BALANCE SHEET FIGURES

There are only a few items in the balance-sheet which require amplification. The expenditure of £2,450 under the heading "Mining Rights" is the transfer duty paid on the cession of the mineral rights to African and European Investment Co., Ltd., by Western Holdings, Ltd., and Blinkpoort Gold Syndicate, Ltd., of those farms which the latter companies agreed to include in your company's lease area and legal and survey charges incurred in connection with the company's mining lease and the exchange of ground between the company and President Steyn Gold Mining Co., Ltd.

The increase of £1,599,493, reflected under the heading "Shaft Sinking, Development and Equipment," represents expenditure during the year on these items amounting to £2,371,879 less an amount of £772,386 refunded to the company by Anglo American (O.F.S.) Housing Co., Ltd., being expenditure incurred by the company on housing to December 31, 1950. The company held 1,127,526 shares in President Steyn Gold Mining Co., Ltd., and 1,000,268 units of stock in President Brand Gold Mining Co., Ltd., at December 31, 1950. These investments had a market value of £1,983,672 at that date.

PROGRESS OF SINKING OPERATIONS

Excellent progress was made during the year on sinking operations on both these companies' properties. At the end of March, 1951, President Steyn No. 1 Shaft had reached a depth of 3,381 ft., while No. 2 Shaft had been sunk to a depth of 3,035 ft. At President Brand, No. 1 Shaft had reached a depth of 2,213 ft., and No. 2 Shaft, which started sinking in March, 1950, had reached a depth of 1,529 ft. at the end of March, 1951. Substantial progress has been made at both mines on the installation of plant and equipment and the erection of buildings. Two boreholes were sunk during the year on the property of President Steyn Gold Mining Co., Ltd., and the intersections of the Basal Reef gave very satisfactory values. The depths at which these holes intersected the Basal Reef indicate that a large block of payable reef is available above the 4,500 ft. level in the vicinity of No. 1 Shaft. It is intended to stop sinking operations temporarily at this shaft just below the Basal Reef horizon to enable an early start to be made on development. This will assist in building up ore reserves and will allow the mine to begin producing at an earlier date than would otherwise have been the case.

Excellent progress has been made in the development of the town of Welkom in which the European employees of your company's mine are housed.

Mining Men and Matters

Mr. P. C. M. Bathurst has taken up the position of assistant mine production engineer to Venterstot Gold Mining Co.

Mr. W. J. Dyack has been appointed mine manager at the Kitere Mine of Kenya Consolidated Goldfields.

Major Kenneth Gordon, managing director of Trinidad Leaseholds has ceased to be a director of the company, and of Regent Oil Co.

Sir Herbert Hutchinson has expressed the wish to retire from his position of Secretary to the National Coal Board as to the end of July. **Mr. C. A. Roberts**, Under-Secretary to the Board since 1947 has been appointed to succeed Sir Herbert Hutchinson from as the beginning of August.

Mr. H. G. Herrington has been elected Vice-President of the Association and **Mr. F. G. Wollard** has been re-elected Chairman of the Executive Committee.

Mr. A. R. McBain has agreed to continue as a part-time member of the Iron & Steel Corporation of Great Britain.

Mr. Austyn Reynolds has been elected President of the Aluminium Development Association for the year 1951/52.

Mr. K. Richardson and **Mr. A. C. Wilson** have been appointed Directors of Mufulira Copper Mines in place of **Mr. J. B. Dennison** and **Mr. C. F. S. Taylor**, resigned.

Mr. T. C. Stibbs has been appointed Deputy Commissioner of Lands and Mines, British Guiana.

Mr. A. E. Upfold has joined the staff of Sierra Leone Selection Trust.

Mr. R. J. Weeks has been elected President of the Institution of Mining Engineers for the year 1952/53 in succession to **Sir Andrew Bryan**.

Mr. A. H. Williams has recently purchased the mines formerly owned by San Antonio de Esquilache (Peru) Mines, Ltd., and the Caballuni Syndicate, located in the Puno district of South Peru.

The Mining and Metallurgical Club Golfing Society will hold their Spring Meeting at Burhill Golf Club, Walton-on-Thames on Tuesday, May 15 next.

The Royal Institution of Chartered Surveyors and the Institute of Mining Surveyors announce that they have appointed a joint committee to advise the councils of the two societies upon questions affecting mining surveying policy, including the education and training of mining surveyors with the object of achieving a concerted approach to the subject. All communications should be addressed to the Joint Secretaries, 12, Great George Street, Westminster, London, S.W.1.

MINING ENGINEER visiting Australia, May to September, can undertake commissions. Box No. 505, Mining Journal, Ltd., 15, George Street, London, E.C.4.

RAND MINES, LIMITED

(Incorporated in the Union of South Africa)

BALANCE SHEET, 31st DECEMBER, 1950

CAPITAL AND LIABILITIES

Share Capital—Registered 2,200,000 Shares of 5s. each, £550,000.	Less 49,005 Shares of 5s. each in reserve, £12,251	£537,749
Issued—2,150,995 Shares of 5s. each		
Investment Reserve —As per Balance Sheet, 31st December, 1949, £4,475,506. Add—Amount realised by the sale of Investments during the year ended 31st December, 1950, less book value thereof and amounts written off Investments and Freehold Properties, £173,109	4,648,615	
Shareholders —Dividends declared but unpaid £484,235. Contingency Reserve pending claims for dividends forfeited since September, 1939, £132,800. Trustees of the Corner House Pension Fund , £788,000. Creditors and Provisions , £283,854	1,688,889	
Exploration Reserve —As per Balance Sheet, 31st December, 1949, £267,935. Less—Expenditure on Ventures charged thereto, £30,738—(237,197. Add—Transfer from Appropriation Account, £100,000	337,197	
Appropriation Account —Balance Unappropriated...	1,640,937	
		£8,853,387

There are Contingent Liabilities as under, viz.:—I.—To finance and to subscribe for shares in certain undertakings. II.—To guarantee housing loans to employees. III.—For contracts open for the supply of Stores, etc. IV.—To guarantee commitments of associated Companies.

Contingent Liabilities.

PROPERTY AND ASSETS		
Freehold Properties and Ventures at cost, less depreciation		£2,421
Shares, Debentures, etc., at or below cost but not exceeding market value, or Directors' valuation, where not quoted		5,658,290
Shares in Subsidiary Companies, at or below cost, but not exceeding Directors' valuation		42,888
Plant, Stores, Vehicles, Furniture, etc., at cost less depreciation		13,538
Advances to Subsidiary Companies		29,900
Debtors, Loans and Payments in Advance, etc.		202,510
Deposits, Fixed and on Call		1,400,178
Government Stocks, etc.		821,888
Cash at Banks and in Hand		84,379
Dividends to be received on Shareholdings		557,395
		£8,853,387

APPROPRIATION ACCOUNT

Taxation	£32,417	
Forfeited Dividends Account	43,077	
Transfer to Exploration Reserve	100,000	
Dividend Account —		
Dividend No. 94 of 3s. 6d. per share, declared 8th June, 1950, £376,424. Dividend No. 95 of 3s. 6d. per share, declared 14th December, 1950, £376,424	752,848	
Balance Unappropriated—		
31st December, 1950—Carried to Balance Sheet	1,640,937	
	£2,569,279	
		£2,569,279

The Full Report and Accounts may be obtained from the London Secretaries, A. MOIR & CO., 4, London Wall Buildings, London, E.C.2, from whom a general Plan of Properties is also obtainable.

Balance Unappropriated—
As per Balance Sheet, 31st December, 1949 ... £1,413,704

Balance of Profit and Loss Account—
For the year ended 31st December, 1950 ... 1,112,575

Transfer from Shareholders Contingency Reserve ... 43,000

NOTE.—The Accounts have been drawn up in accordance with the normal practice of the Company; an amount of £173,109 realised by the sale of Investments during the year, less book value thereof and amounts written off Investments and Freehold Properties having been dealt with through the Investment Reserve shown in the Balance Sheet.

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GENERAL EXPLORATION ORANGE FREE STATE LTD.

(Incorporated in the Union of South Africa)

AUTHORISED CAPITAL	£1,000,000
ISSUED CAPITAL	£605,625

DIRECTORATE:

E. L. LLOYD, SIR GEORGE W. ALBU, Bart. (Chairman)
C. S. McLEAN, T. W. T. BAINES, W. PATRICK JONES,
G. V. R. RICHDALE, J. A. YOUNG, S. R. FLEISCHER, C.B.E., D.S.O., M.C.

ABRIDGED REPORT AND ACCOUNTS FOR YEAR ENDED 31st DECEMBER 1950

OPTIONS AND PARTICIPATING RIGHTS—During the year an area of 6,888 morgen held under option was abandoned. Further mineral rights options over 18,696 morgen were acquired in the Bothaville and Kroonstad districts, the total area of such options held in the Orange Free State at the end of the year approximately 61,000 morgen.

The Company continues to hold mineral rights over approximately 7,537 morgen in the Ventersburg and Winburg districts.

The holding of surface right options remains unchanged at approximately 1,500 morgen.

SHARE INVESTMENTS—During the year the Company exercised its option to acquire 100% of the shares of part of Barides Freddie North Lease Area Ltd. and Barides South Lease Area Ltd., and at a later stage took up its rights to subscribe for the 5 per cent. Registered Unsecured Convertible Loan Stock issued by both these Companies. In addition participation rights were exercised in the subscription for the initial capital of Virginia Orange Free State Gold Mining Co. Ltd. and Merrispark (Orange Free State) Gold Mining Co. Ltd. flotation. Investments have been taken into account or below cost, but in no case above market price at December 31, 1950.

GENERAL. During the year under review an agreement the basis of which had previously been discussed in general terms was concluded

between Anglo-Transvaal Consolidated Investment Co. Ltd., General Mining and Finance Corporation Ltd., Middle Witwatersrand (Western Areas) Ltd. and this Company for the pooling of contiguous ground in which the two latter companies are interested for the purpose of mining leases. Considerations in this area affected consist of the Farm Van den Heever and Klipfontein, Britzpan, Kruisfontein, Rustfontein, Middle Witwatersrand (Western Areas) Ltd. and Spes Bouy Rosedale Weltevreden and Welgevonden (held by this company). In the event of it being decided to make an application to the Mining Leases Board for a mining lease the first company to be formed for this purpose will be under the administration of Anglo-Transvaal Consolidated Investment Co. Ltd. Middle Witwatersrand (Western Areas) Ltd. will participate in the vendors and subscription rights of such company pro rata to the estimated payable tonnage contributed by each company provided that Middle Witwatersrand (Western Areas) Ltd. receives a minimum of 25 per cent vendors and 25 per cent subscription rights in respect of this first mining area. Any areas referred to above will be subject to the same arrangement. In the addition of General Mining and Finance Corporation Ltd. and vendors and subscription rights shall be based pro rata to the estimated payable tonnage contributed by the participants.

Dr. BALANCE SHEET at 31st DECEMBER, 1950 Cr.

	1949 £	1950 £	£	1949 £	1950 £	£
Share Capital—				Properties & Mineral Rights , at cost—		
Authorised:—				Balance at December 31, 1949.....	100,395	£
8,000,000 Shares of 2s. 6d. each, convertible into Stock.....	1,000,000			Additions and improvements during 1950	5,973	
Issued:—				Transfer from option and participation Rights	26,706	133,074
4,845,000 Shares of 2s. 6d. each, converted into Stock and transferable in multiples of 2s. 6d.	605,625	170,554				
Share Premiums—				Option and Participation Rights—		
At December 31, 1949.....	233,210			Balance at December 31, 1949.....	170,554	
Less—Amount transferred to Appropriation Account.....	233,210			Expenditure during 1950	20,850	
Exploration Reserve	30,092				191,404	
Creditors				Less: Options abandoned	97,480	
General Mining and Finance Corporation Ltd.—Loan with interest accrued.....	100,244	106,352		Transfer to Properties and Mineral Rights	26,706	
6,637 Sundry Creditors.....	9,864	110,108			124,196	67,208
Drilling and Prospecting—				Less: Amounts written off in respect of Areas abandoned	52,951	132,812
Investments—				At cost or Market Value whichever was lower.....	221,110	376,217
				I written off.....	183	180
				Office Furniture and Fittings, etc.....	4,372	183
				Debtors	222,482	5,406
				Cash	20,023	6,255
				Appropriation Account		24,510
£845,472		£745,825		£845,472		£745,825

Copies of the full Report and Accounts are available at the London Office of the Company, Winchester House, Old Broad Street, E.C.2

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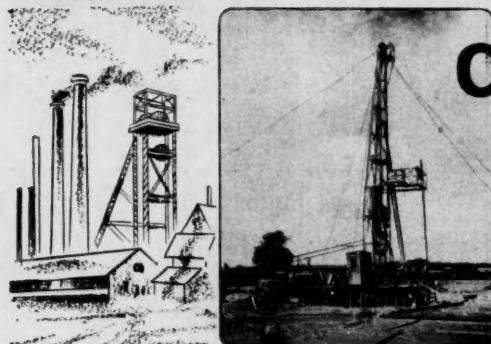


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